ST ENGINEERING
LIBRARY

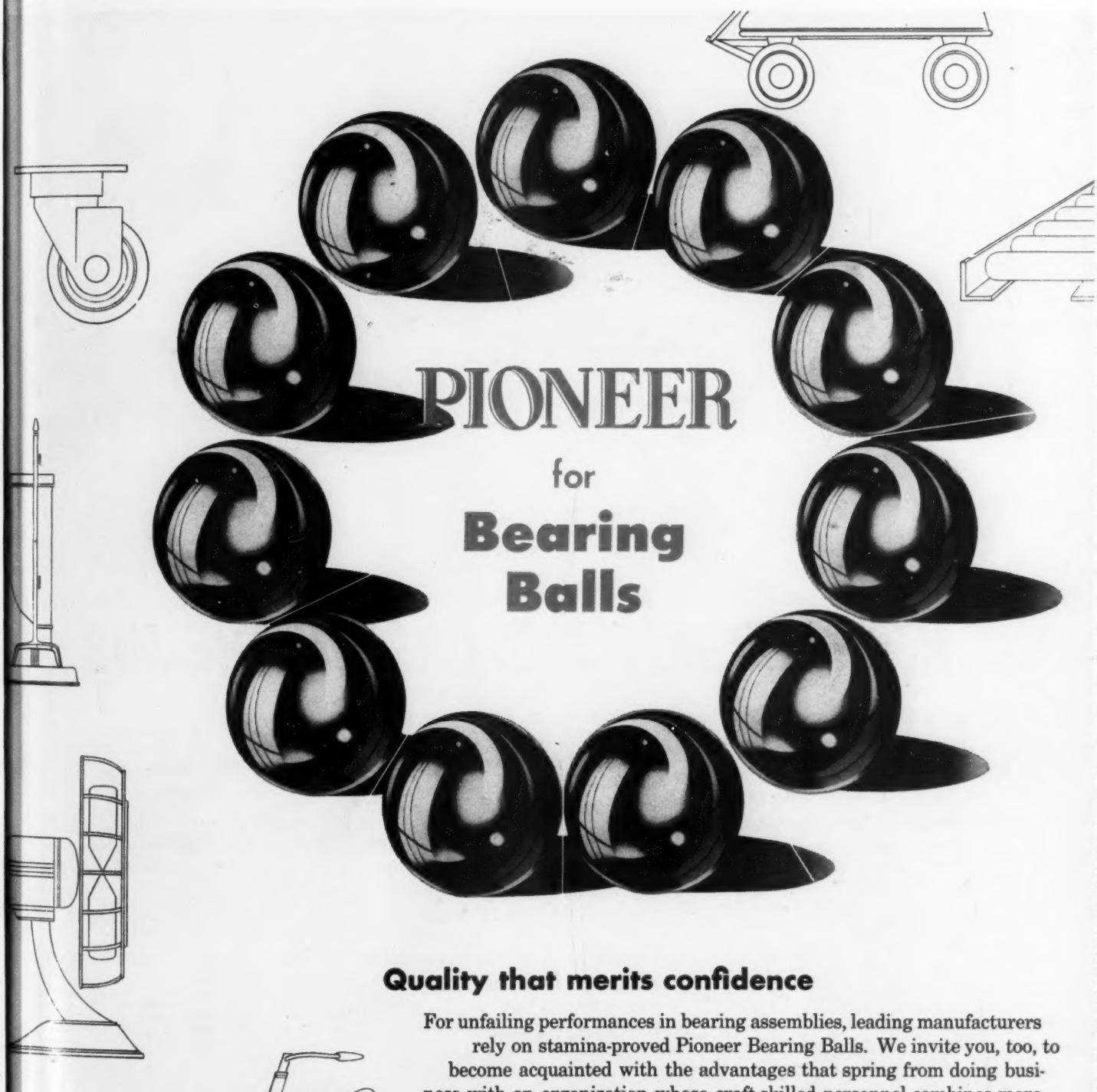
October 31, 1949

OCT 31 1949

STEEL

The Magazine of Metalworking and Metalproducing

CONTENTS — PAGE 9



Quality that merits confidence

For unfailing performances in bearing assemblies, leading manufacturers rely on stamina-proved Pioneer Bearing Balls. We invite you, too, to become acquainted with the advantages that spring from doing business with an organization whose craft-skilled personnel combines more than a century and a quarter of specialized ball making experience.

Pioneer Steel Ball Incorporated · Unionville, Conn.

A completely rebuilt motor is tested with dynamometer. This machine applies low voltage and overloads exactly as in actual usage.

Complete Facilities

KEEP ELECTRIC MOTORS ON THE JOB

California Electric Works, San Diego, features modern equipment, large stock of parts, 2 shift operation, 24 hour service in emergencies to give top-flight Allis-Chalmers Certified Service

IN SAN DIEGO, and *every* major industrial center in the United States you will find an outstanding, independent Allis-Chalmers Certified Service shop.

These shops have been carefully picked for their experience, highly skilled workmen, modern equipment and business reputation. Each uses nothing but factory approved methods and parts.

So when you need service on electrical equipment, call the nearest Allis-Chalmers Certified Service shop. You can be sure of fine workmanship, fast service and fair prices.

GOOD SOURCE FOR NEW MOTORS, TOO

Your Allis-Chalmers Certified Service Shop or Authorized Dealer can give you the same fast, dependable delivery on new motors. Whichever you need, new motors or service on your present equipment, you can depend on your Allis-Chalmers Certified Service shop. A-2885

ALLIS-CHALMERS, 1021A SO. 70 ST.
MILWAUKEE, WIS.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

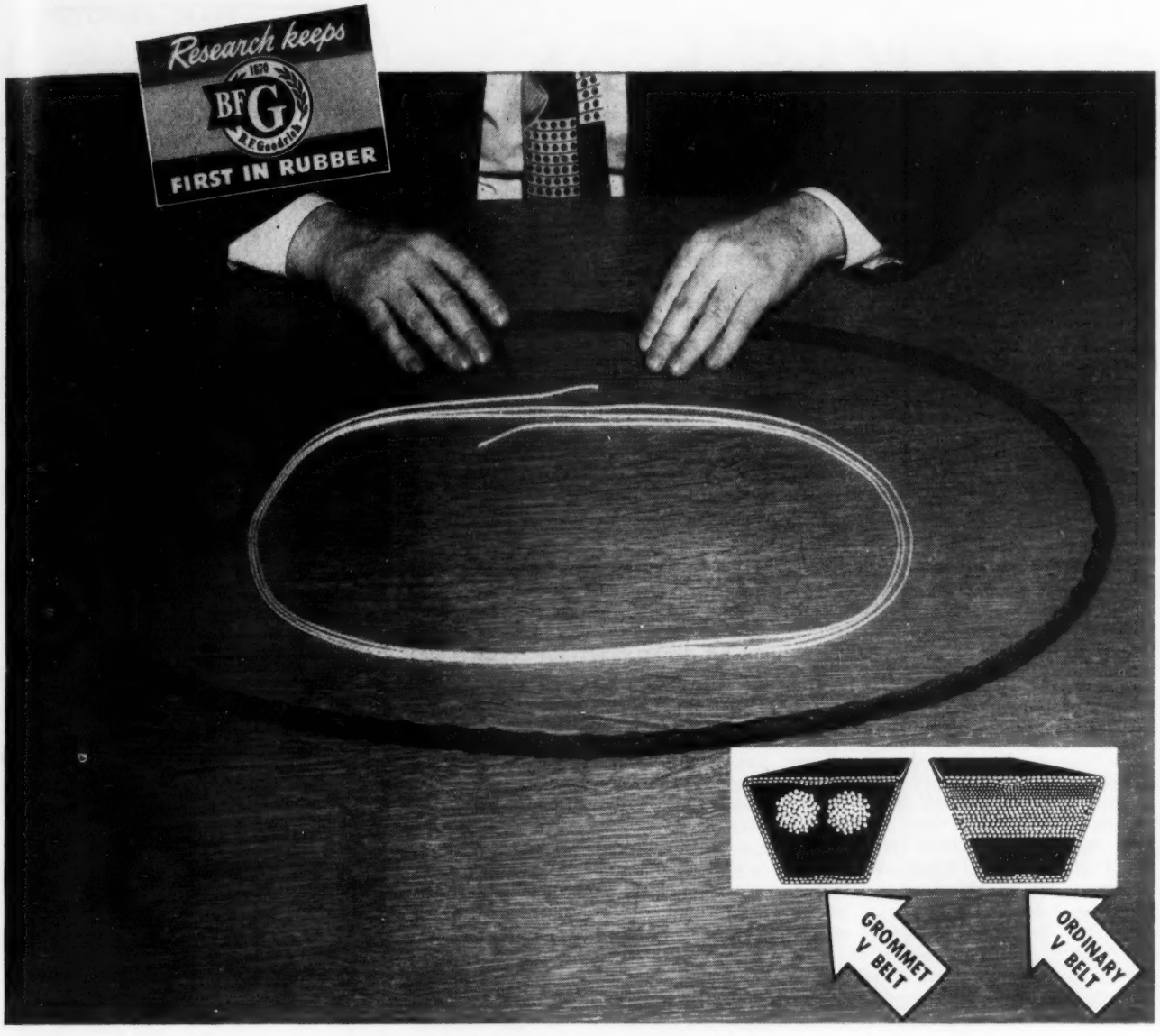
CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS



What is this thing called a grommet?

New B. F. Goodrich grommet V belts cut costs 20 to 50%

No—a grommet is not an ordinary cable. It is a patented construction in which heavy cord is wound upon itself to form an endless loop. An ordinary cable is merely a twisted cord, the ends of which must be overlapped to make a loop. (See the picture above.) The difference is important to you, because a B. F. Goodrich grommet V belt delivers 20 to 50% more V belt value *at no extra cost.*

Grommet belts are more flexible—They have no splice, no stiff section where cords overlap (85% of failures of ordinary belts occur in overlapped sections). B. F. Goodrich belts have twin grommets, no fabric or plies in the middle of the belt that stiffen it and generate heat. They have more elasticity, less permanent stretch than any other belt.

Stand shocks better—Actual running tests in field and laboratory show that B. F. Goodrich grommet V belts have a higher safety factor, much greater ability to withstand shock load than do ordinary V belts—actually lasted 20 to 50% longer!

No "lost" cords—In an ordinary V belt much of the cord strength is lost—wasted because all the cords don't pull their share of the load. In a grommet belt all the cords work all the time.

Only BFG has the grommet belt—Twin grommet construction is an exclusive, patented B. F. Goodrich development (U.S. Patent No. 2,233,294). Make sure you get genuine grommet V belts, (for the present made only in the larger—the D and E sizes). Ask your BFG salesman to show you his "X-ray" belt that illustrates grommet construction clearly. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY

B.F.Goodrich

Behind the Scenes...

Last of the Show

May seem to you like a lot of ancient history by now, seeing as how it's already Hallowe'en, but we're fresh from the Metal Show while we write this, and we'd like to thank all of you nice people who stopped by our booth to say hello. There were quite a few of you, and we were overwhelmed. The booth was real sharp, too. Hit of the show, and all that sort of thing. Our flowers never did get tired, and that soft new furniture was well sat on all week. In fact, we'd like to have had some more time to wander around and find out about things. Never did get a chance to pick up some of those whistles from Lindberg Engineering, or some of those junior barrels that Alcoa was turning out by the carload lot. We liked very much the soft foam rubber mat under that carpet in the Stokes Machine booth, and almost gave up drinking when one of those Westinghouse birds suddenly stopped munching on its food, looked us straight in the eye, and said, *"How* are you?" We asked one of the Westinghouse boys what they fed those critters, and we learned that it was mocking bird food, which seems appropriate for anything as loquacious as those two! There were a lot of other non-technical highspots which we should probably report to you, but since we have a few other things to talk about this week, we'll have to get on.

In This Issue

Don't forget to catch Walt Campbell's pension plan perusal this week. Easy to find. Just take a quick walk back to the news section and it will be right there, staring you in the face. And back in our production-engineering section you'll find the start of a series on stainless, from out of Carpenter Steel. While you're back there, take a look at Doc Gray's opus on chemical finishes on aluminum. Mighty fine stuff to know about.

Rounder Proof

We were stopped dead in our tracks while going through last week's book. We came across a metalworking company whose products include rounder proofers. Now it may be that you are completely familiar with rounder proofers, and that our surprise is unfounded. But in any case, we were intrigued. With a good rounder proofer in your vest pocket, you might be able to make spot analyses of characters who confront you from time to time. With a whistle, or bell, or flashing light, the device would be invaluable. While engaged in conversation with a stranger, you could relax and be comfortable, knowing that if he were of questionable nature, your little bell or whistle or light would go off. You could then stand stanchly before him, present the evidence, and in a loud voice proclaim, "You, sir, are a rounder!" before curtly turning on your heel and stalking into the distance, head held high. Some day we're going to have to look into the facts and find out what a rounder proofer really is!

Art for Art Dept.'s Sake

John Morgan, of our editorial staff, says we should tell you folks about our art department. It's really something to talk about, too. All those fancy new charts, the streamlined statistical presentations and so forth you've been seeing in the past few issues have come out of the Green Room. Our Art Dept. is all refurnished with new gray metal furniture, with green upholstery on the chairs, foam rubber and all that sort of thing. The walls are a pale green, new fluorescent lights dazzle the eyes of us ordinary workers, and everybody from Don Cadot in his Art Editor's chair to Lazy Lucy back in the southeast corner has taken on new atmosphere. Lest anybody think Lazy Lucy might be an indigent female artiste, we hasten to add that she's a gimmick, designed to make big pictures out of little ones.

Puzzle Corner

In last week's puzzle, the star enclosed 112.26 square inches, while there were 201.9 square inches in the circle but not in the star. By a strange coincidence, those two figures add up to 10 pi, which they should. Here's a quickie, good for about thirty seconds of your time if you have good powers of visualization: A small gear has eight teeth, numbered one to eight. It is meshed with a 24-tooth gear. If the small gear starts at the bottom of the large gear with the number 1 in a vertical position, and is revolved around the large gear, how many times will the number 1 be in a vertical position in one complete revolution?

Shrdlu

(Editorial Index—page 9)

STEEL

Vol. 125—No. 18 · October 31, 1949

BUSINESS STAFF

J. W. ZUBER
Business Manager

ADVERTISING

C. H. BAILEY
Service Manager

A. V. ANDERSON
Production Manager

New York:
E. W. KREUTZBERG, K. A. ZOLLNER
CALVIN FISHER, JR.

Pittsburgh:
S. H. JASPER, B. C. SNELL

Chicago:
L. C. PELOTT, V. G. BRETTMAN

Cleveland:
D. C. KIEFER, H. G. ROWLAND
W. L. POLAND

Los Angeles:
F. J. FULLER

•

CIRCULATION

H. E. METZNER
Circulation Department Manager

G. R. EBERSOLE
List Department Manager

Circulation Representatives

D. G. HEWITT, *Manager*
H. R. DUNNE, E. L. FRANKE, C. A. PRICE
J. S. BROWN

•

MAIN OFFICE

Penton Building, Cleveland 13, Ohio
Main 8260

BRANCH OFFICES

New York 17.....16 East 43rd St.
Murray Hill 2-2581

Chicago 11.....520 North Michigan Ave.
Whitehall 4-1234

Pittsburgh 19 .....2806 Koppers Bldg.
Atlantic 1-3211

Los Angeles 4 130 N. New Hampshire Ave.
Dunkirk 2-1758

London: 2 Caxton St., Westminster, S.W.1

Published by

THE PENTON PUBLISHING COMPANY

E. L. SHANER ...*Chairman and Treasurer*
G. O. HAYS..... *President*
R. C. JAENKE *Vice Pres., Director of Adv.*
F. G. STEINEBACH *Vice Pres., and Secretary*

Also publisher of
THE FOUNDRY • MACHINE DESIGN
NEW EQUIPMENT DIGEST

Member, Audit Bureau of Circulations; Controlled Circulation Audit, Inc.; and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (current issues) 35c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879. Copyright 1949 by the Penton Publishing Company.

Editorial Staff on Contents Page

ABC ECA

EDITORIAL STAFF

E. L. SHANER
Editor-in-Chief

IRWIN H. SUCH
Editor

WALTER J. CAMPBELL
News Editor

WM. M. ROONEY
Market Editor

JAY DEEULIS
Engineering Editor

J. D. KNOX
Steel Plant Editor

GUY HUBBARD
Machine Tool Editor

ALLEN G. GRAY
Consulting Editor

DON S. CADOT
Art Editor

ASSOCIATE EDITORS

WALTER F. TOERGE
DAN REEBEL

VANCE BELL
FRANK R. BRIGGS

ASSISTANT EDITORS

HENRY J. HOLTZ • DOLORES K. MAILLE
JOHN S. MORGAN • L. J. SKUDERIN
EDWIN L. KARPICK • M. T. BORGERHOFF
EDWARD C. BIRKNER

RESIDENT EDITORS

E. C. KREUTZBERG
Washington Editor

B. K. PRICE
Eastern Editor, New York

L. E. BROWNE
Associate Editor, New York, Boston

J. C. SULLIVAN
Pittsburgh Editor

A. H. ALLEN
Detroit Editor

E. F. ROSS
Chicago Engineering Editor

HOWARD C. TUTTLE
Chicago News and Market Editor

VINCENT DELPORT
European Editor, London

EDITORIAL CORRESPONDENTS

R. W. KINCEY, *Birmingham*
L. C. FELDMANN, *Buffalo*
SAMUEL S. CARR, *Cincinnati*
MAC L. HUTCHENS, *St. Louis*
GEORGE R. REISS, *Youngstown*
BERT D. LYNN, *Los Angeles*
ROBERT BOTTORFF, *San Francisco*
R. C. HILL, *Seattle*
C. K. CATES, *Dallas*
F. S. TOBIN, *Toronto*
J. A. HORTON, *Birmingham, Eng.*
LEON JAUDOIN, *Paris, France*
JACQUES FOULON, *Liege, Belgium*
HERBERT GROSS, *Dusseldorf, Germany*

MAIN OFFICE

Penton Building, Cleveland 13, Ohio
Main 8260

BRANCH OFFICES

New York 17 ..... 16 East 43rd St.
Murray Hill 2-2581

Chicago 11 ..... 520 North Michigan Ave.
Whitehall 4-1234

Pittsburgh 19 ..... 2806 Koppers Bldg.
Atlantic 1-3211

Detroit 2 ..... 6560 Cass Ave.
Madison 3024

Washington 4 ... 1123 National Press Bldg.
Executive 6849

Los Angeles 28 ..... 1452 N. Seward St.
Hudson 2-4439

London ... 2 Caxton St., Westminster, S.W.1

Business Staff on Page 4

NEXT WEEK . . .

Cupping of Thick Steel Blanks During Cold Forming

How Chromium Plating Affects Fatigue Life of Aircraft Steels

Producing Intricate Parts Via Vacuum Investment Casting

Production of Stainless Steels—II

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 125, NO. 18 OCTOBER 31, 1949

NEWS

Await White House Strike Action ... 17
Two Score Companies Sign with United Steelworkers ... 18
Steel Earnings Drop ... 19
Outlook Good for Capital Equipment Sales ... 20
Copper, Brass Demand Rises ... 21
Government Wants To Do Business with You ... 21
Gas Industry Booms ... 22
More U.S. Imports from Europe Vital ... 23
★ Windows of Washington ... 24
Suggestions Pay Off ... 27
★ Calendar of Meetings ... 27
Small Companies Face Puzzling Pension Problems ... 28
★ Mirrors of Motordom ... 31
Jet Testing Laboratory Completed by United Aircraft ... 34
★ Briefs ... 35
★ The Business Trend ... 37
★ Men of Industry ... 38
★ Construction and Enterprise ... 108

PRODUCTION-ENGINEERING

★ Production and Engineering News at a Glance ... 45
New Age Hardening Alloy Meets Many Engineering Specifications ... 46
★ Seen and Heard in the Machinery Field ... 50
Unusual Screw Machine Operations Step Up Auto Component Production ... 51
Can You Use Chemical Methods in Finishing Aluminum? ... 53
Hobbing Cavities in Alloy Steels ... 62
★ Progress in Steelmaking—Production of Stainless Steels, Part I ... 64
★ Letters to the Editors ... 74
★ New Products and Equipment ... 77
★ Helpful Literature ... 80

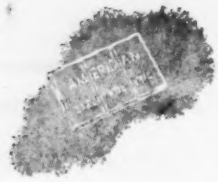
MARKETS

★ Market Summary ... 83
★ Metal Prices and Composites ... 84
Metal Fabricators Curtail Output ... 90

★ *Advertising Index* ... 114

Editorial Index available semiannually; STEEL also is indexed regularly by Engineering Index Inc., 29 West 39th St., New York 18

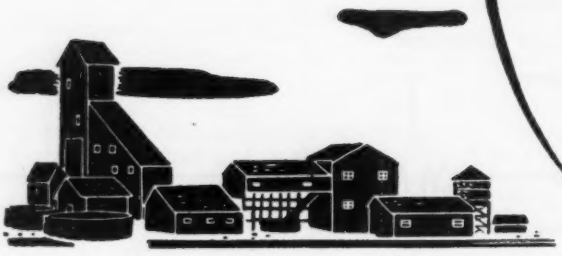
★ Denotes Regular Features.



99.99+% slab zinc

American Electrolytic

a reliable source for die casting requirements



AMERICAN ZINC SALES CO., Distributors

for AMERICAN ZINC, LEAD & SMELTING CO.

COLUMBUS, OHIO

CHICAGO

ST. LOUIS

NEW YORK

October 31, 1949

Proves Need of T-H

Early last September when Ford Motor Co. was threatened with a strike, the Detroit Board of Commerce ran full-page ads in the newspapers calling upon union and company to consider carefully the full costs of a shutdown before permitting a strike to occur. The ads went into detail as to the losses incurred as a result of the 23-day Ford strike last May and concluded: "How much better it would be to compute the costs in advance—the net cost to everyone —before the suffering caused by strikes is actually experienced!"

Today it is becoming increasingly apparent that millions of persons affected by the coal and steel strikes wish they had had an opportunity not only to know the net cost of the strikes in advance but also to have a more effective voice in deciding whether or not a strike would be desirable. Newspapers in coal and steel districts currently are publishing numerous letters-to-the-editor from employees who complain that they were given no opportunity to vote on whether to strike or not to strike.

Presumably the voice of union members is expressed through the medium of an executive board whose members are supposed to follow the wishes of a majority of the members. Even assuming that the system works on a truly representative basis, there is one serious flaw in the manner in which a decision to strike is reached. The decision usually is made before the points at issue are clearly defined in the minds of the rank and file of union members.

This certainly was true in the steel strike. Members of unions whose officers were on the point of signing contracts with individual companies on terms much more favorable than those demanded by Mr. Murray on an industry-wide basis certainly would not have sanctioned a strike if they had been given an opportunity to vote.

The present unfortunate experience proves conclusively that better machinery should be provided to permit the will of persons affected by strikes to be expressed more effectively. In reality, the sorry mess shouts to heaven for something like the Taft-Hartley Act, which in many ways protects union members and the public against abuses by union dictators.

* * *

MORE FLEXIBLE PRICING: All signs point to a more liberal attitude toward pricing methods on the part of the Federal Trade Commission. The change of heart by a majority of the commissioners stems from their realization that the O'Mahoney bill as passed by the House, if passed by the Senate and signed by the President, would strip FTC of its authority over pricing systems.

Commissioners usually are human enough to want to retain their cherished prerogatives. Therefore FTC between now and the time Congress convenes will do everything possible to prove that the remedies provided by the O'Mahoney bill are not necessary. By liberalizing its policies on pricing methods, FTC hopes to demonstrate to the Senate that there is no need to pass the O'Mahoney bill.

This "about-face" attitude is reflected in the pending agreement between commission and steel company attorneys in the case against the former multiple basing point, delivered price system. Under the proposed settlement mills will be required to quote f.o.b. mill prices and to sell at these prices when so requested by the consumer. Mills can absorb freight except when

(OVER)

AS THE EDITOR VIEWS THE NEWS

such absorption "unlawfully lessens competition." Each producer would establish his own extras without reference to his competitors.

If this agreement goes into effect, its more liberal provision on freight absorption will make for greater flexibility in pricing, which will benefit sellers and buyers alike. —p. 24

* * *

OVERDUE STREAMLINING: Purchasing agents who buy for federal, state and municipal governments are becoming conscious of the fact that many private suppliers shy away from desirable public business because its procurement often involves too much inconvenience and too many complications. At the fourth annual conference and products exhibit of the National Institute of Government Purchasing, held in Cleveland last week, government purchasing personnel stressed the importance of streamlining their operations so as to attract more private suppliers.

The number of sales managers in the metalworking industries who will welcome this praiseworthy reform is legion. Every taxpayer should hail it with delight. Everybody will benefit by a simplification of the endless and senseless routines which have characterized much of the procurement procedures of government units. —p. 21

* * *

CONSERVATION PIONEERS: As our nation grows older, it is inevitable that agriculturalists and industrialists will discover that they have many interests in common. For instance, the upland farmer who sees his precious top soil washed away by erosion will understand the annoyance of the manufacturer in the valley whose operations are threatened by lack of water or by deposits of silt in the river or harbor which affords water transportation to his plant.

Sooner or later both will be attracted to the possibilities of conservation. Some industrialists already have seen the light. Among the pioneers in this respect are Fred H. Chapin, president of National Acme Co., and Mrs. Chapin, who recently deeded a forest acreage to the state of Ohio to save it from the devastation of a ruthless lumbering operation.

Soil erosion and constantly lowering water tables are a definite threat to industry in many sections of the country. Industrial management can well afford to team up with farmers to combat this menace. —p. 50

OUR NATIONAL TRAGEDY: Resignation of Dr. Edwin G. Nourse as chairman of the President's Council of Economic Advisers is one of the drab aspects of the present chaotic situation in Washington. Here is a man of unquestioned ability who is forced to give up his post because he has found that under the present regime economics must be prostituted to the exigencies of raw politics. He simply cannot condone the questionable policies his chief is pursuing.

The loss of one good man in government service ordinarily would not occasion much comment. It happens frequently. But when one sees capable men like Doctor Nourse retiring in disgust at the same time men of mediocre abilities such as Mon Wallgren are going into government service with reluctant Congressional approval, one wonders what will be the end result. How many really capable men in Washington do you think are in full sympathy with President Truman's policies? Our guess is that virtually every well qualified man in a responsible government post is deeply concerned about the influx of incompetent political hacks. It is a national tragedy. —p. 24

* * *

A CLASSIC IN BREVITY: Fifteenth in this publication's series of articles on the fundamentals of steelmaking is "Production of Stainless Steel," the first installment of which appears in this issue. The author is B. H. DeLong, vice president and technical director of Carpenter Steel Co., whose eminent career in metallurgy spans the entire era of stainless steel to date.

In introducing his subject, Mr. DeLong refers to the pioneer work of Harry Brearley and quotes claim 4 of his U. S. Patent 1,197,256 dated Sept. 5, 1916: "A hardened and polished article of manufacture composed of a ferrous alloy containing approximately C—0.30 per cent, Mn—0.30 per cent and Cr—13.0 per cent." Mr. DeLong points out that this patent not only is historical because of its significance, but "it should remain as a classic example of literary brevity. It contains only 90 lines."

Anybody who has delved through patents or who reads the Patent Gazette must realize that a 90-line patent is a rarity. —p. 64

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

STRIKES— Presidential intervention in the steel and coal strikes may come soon (pp. 17, 18). One million workers will be idled by the steel walkout alone by Nov. 1 and 5 million if it lasts until Dec. 1. If the steel dispute should end tomorrow, 8.5 million tons of ingots and castings will be lost, counting the four weeks of strike and the time that will be needed to regain normal production.

BUSINESS WEATHER— Worried about the economic outlook? Steel company earnings were down in the third quarter even though that period was unaffected by strikes (p. 19). But good prospects are seen for capital equipment manufacturers (p. 20), government suppliers (p. 21) and specialists in gas industry construction (p. 22). Machinery makers expect a fair year ahead; they will stress cost-cutting potentialities of new equipment. Government purchasers who buy billions of dollars worth of goods and services annually are streamlining their methods to attract more private suppliers. Anticipated construction expenditures for gas utilities total $3.5 billion for 1948-1952.

COPPER— Another significant business barometer may be this: Domestic copper consumpition in September hit the highest peak since a year ago (p. 21). October figures will at least equal those of the previous month, despite the wet blanket thrown on the economy by strikes.

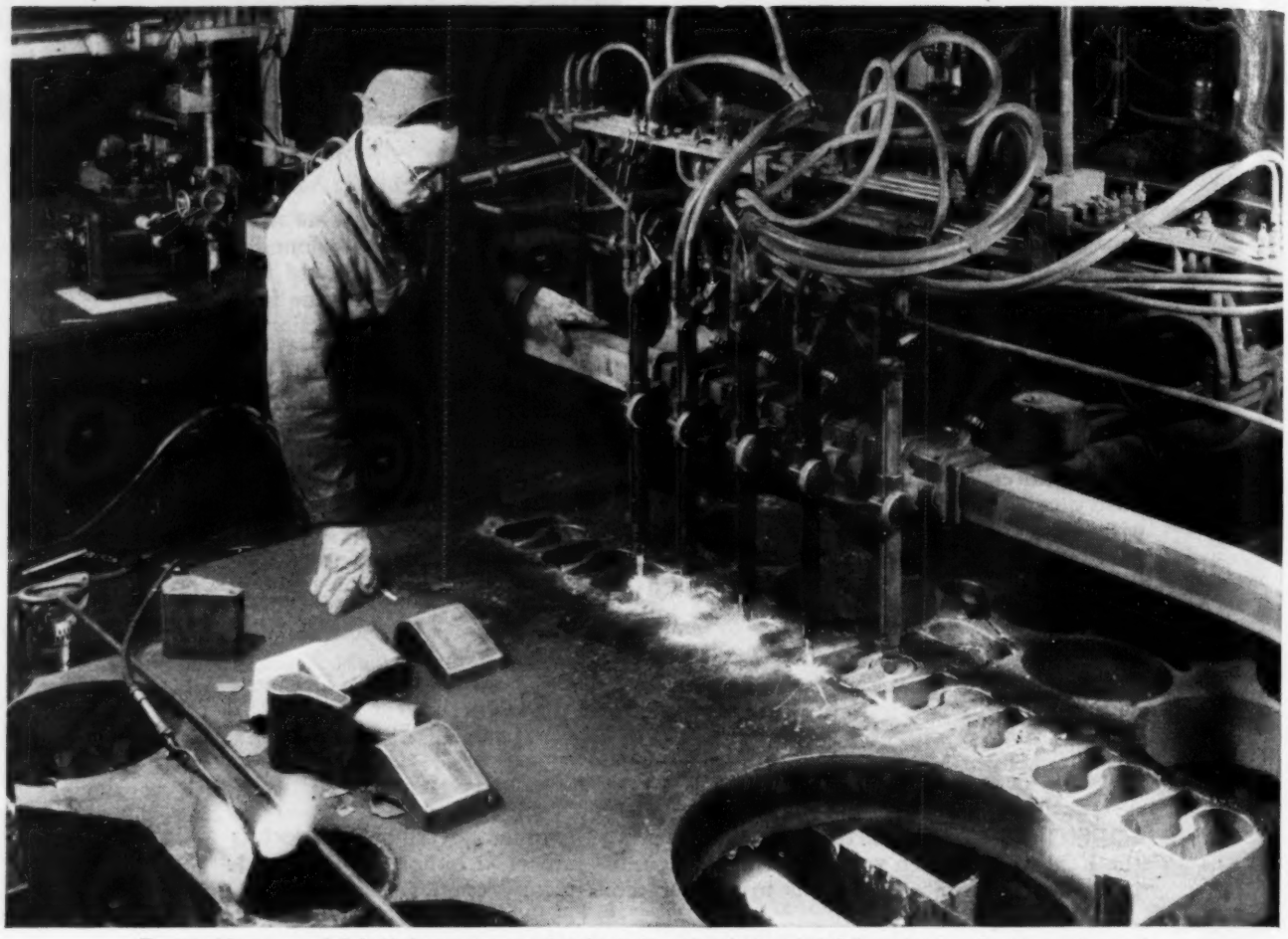
FOREIGN— What may be far more than just another government report is the ECA study which warns that the U. S. must import $2 billion more in goods annually if Western Europe is to survive economically (p. 23).

PRICING— A basis for settlement of the government suit against the former multiple basing point, delivered-price system of pricing in the steel industry has been drawn up by steel company attorneys in collaboration with Federal Trade Commission attorneys (p. 24). The agreement, which if formally approved by the FTC, would terminate lengthy legal arguments and clarify what pricing procedures the steel companies could use. High spots of the agreement are reported to be: 1. Steel mills would have to quote f.o.b. mill prices and be willing to sell at them when so requested by the consumer; 2. mills could absorb freight except when such absorption unlawfully lessens competition; 3. collusion in establishing prices is prohibited; 4. prices must be established for each point of production; 5. use of freight rate books as published by the American Iron & Steel Institute would be prohibited; and 6. steel companies would not be required to admit to the FTC charge of conspiracy in setting of prices in the past.

SMALL COMPANY PENSIONS— If yours is a small company and the puzzle of pensions appears unsolvable, suggestions on pp. 28 and 29 may provide a sword to cut the Gordian Knot. One way for small firms to meet the high costs involved in setting up a pension plan may be through co-operative action.

HERE AND THERE IN INDUSTRY— Foreign business in machine tools dropped to a low for the year in September because of currency devaluations (p. 20) . . . Stockpiling of strategic and critical materials will be stepped up for the remainder of fiscal 1950 (p. 26) . . . An alltime record year in auto output is certain despite the steel strike (p. 31) . . . Cost cutting with a bonus in better employer-employee relations is seen resulting from a properly administered suggestion system (p. 27) . . . United Aircraft Corp. saved money for its new experimental jet engine testing laboratory when officials short-stopped power generating equipment to have been junked from Navy cruisers and war-surplus, lend-lease vessels . . . Robert W. Wolcott has been named chairman of Lukens Steel Co. and Charles Lukens Huston Jr., formerly vice president and executive assistant to the president, will succeed him as president . . . Apex Electrical Mfg. Co., Cleveland, reports its third quarter sales of home appliances were 32 per cent above those of the second period.

Engineering News, p. 45 *Market Summary, p. 83*



The metal box, upper left behind operator, contains electronic tracing device which follows sketch and guides cutting torch.

New Electric Eye Machines Speed Ryerson Cutting Service

The multiple-torch gas cutting machine shown above is one of eleven recently installed in Ryerson plants from coast to coast. Equipped with an electronic eye tracing device, these remarkable new machines cut the most intricate shapes swiftly, accurately. Time spent in preparing wood and metal templates is eliminated. Instead the electric eye follows a simple sketch or blueprint within plus or minus fifteen-thousandths of an inch!

Many manufacturers are saving time and effecting substantial economies through the use of Ryerson flame-cutting. With electric eye machines rounding out a complete flame-cutting service, your Ryerson plant produces an endless variety of shapes from strong rolled steel. To mention only a few—circles, rings, wrenches, flanges, crankshafts, weldment parts, cams—many more. The result: clean, accurate edges whether mild steel, high carbon, alloy or stainless steel is used. And your Ryerson plant can produce hundreds of pieces to the same pattern with almost die-cut uniformity, from steel plate up to 15-in. thick.

The new Ryerson cutting machines illustrate how we are continually expanding our facilities to give you faster, more efficient steel service. Despite the steel strike, we are still able to ship a fair share of most requirements. So continue to call us when you need steel—no matter what the kind or size.

PRINCIPAL PRODUCTS

BARS—Carbon & alloy, hot rolled & cold finished.
SHAFTING—Cold fin., ground & polished, etc.
STRUCTURALS—Channels, angles, beams, etc.
TUBING—Seamless & welded mechanical & boiler tubes.
STAINLESS—Allegheny bars, tubing, plates, sheets, etc.
PLATES—Sheared & U. M., Inland 4-Way Floor Plate.
SHEETS—Hot & cold rolled, many types.
MACHINERY & TOOLS—METAL WORKING EQUIPMENT

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

STEEL
A PENTON PUBLICATION

Await White House Strike Action

Stage ready for President to step into coal and steel stoppages. Mediation expected to be first move in steel, with seizure of mills as a last resort

WATCH for White House intervention in the steel and coal strikes as effects of the twin stoppages fan out through the economy.

Mediation efforts of Cyrus S. Ching and his staff have come to naught. Both management and union chiefs remain adamant.

Increasingly, both sides are looking for a move by the administration to get the disputes off dead center.

Losses Pile Up — Production and employment losses caused by the strikes to date are staggering. They now are mounting in geometrical rather than arithmetical progression. Hundreds of metalworking companies soon will be forced to close down for lack of steel.

Already 5.7 million tons of ingot production has been lost. If the steel strike were to end at once, between two and three million additional tons of output would be lost before facilities resumed normal production.

Should the steel strike continue to Dec. 1, five million workers would be idled and the loss in steel production would exceed 14 million tons.

The 6-weeks-old coal strike is idling 400,000 miners, more than 100,000 railroad employees.

Compromise Offer Anticipated — Presidential intervention in the steel strike is expected to appear first as an offer of White House mediation at which a compromise settlement would be suggested. One such compromise which might be acceptable would be on the basis of the industry contributing the 10 cents an hour toward the social security package as recommended by the fact-finding board with a stipulation that the cost of any future expansion of the package would be shared by the workers.

Seizure as Last Resort — Should White House mediation fail, seizure of steel mills and coal mines will become a more distinct possibility.

Steel Output Losses Mount

Nearly 5.7 million net tons of steel ingots and castings have thus far been lost in the four weeks of the steel strike. Since the beginning of the walkout Oct. 1, the industry has been operating at rates ranging from 7.5 to 9.5 per cent of capacity.

This table gives estimated annual productions assuming the strike will end at various dates. Although the dates are figured through Dec. 15, it is unlikely the strike will last that long. Calculations are based on these assumptions: That the yearly output would have been 85 million net tons if there had been no strike; that the industry would operate at 85 per cent of capacity, the rate as of Sept. 30; that 2.8 million tons will be lost from the time the strike ends until full production is resumed.

Figures in table are in millions of net tons.

IF:	Yearly Output	Loss
No strike	85.0	—
It ends Nov. 1	76.5	8.5
It ends Nov. 15	73.7	11.3
It ends Dec. 1	70.9	14.1
It ends Dec. 15	68.1	16.9

Time Lag When Strike Ends

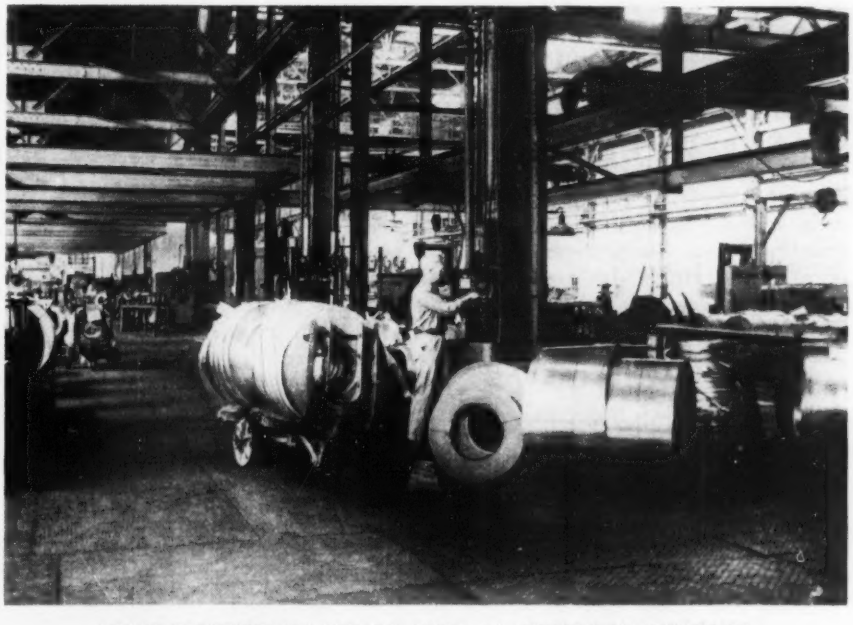
Don't expect resumption of large-scale steel deliveries even a week after the strike ends. It may take four to five weeks after the walkout is over before you will receive shipments of some finished products like cold-rolled sheets.

After the 27-day steel dispute which began Jan. 21, 1946, ingot and castings production was only 16 per cent of capacity one week following settlement. Within three weeks basic production was nearly normal.

Under ideal conditions coke ovens can produce coke in quantity one week after resumption of operations. Three to four days are required to get blast furnaces into production, assuming they are not allowed to become cold. From two days to as much as three weeks are needed to get open hearths at full capacity operation. Under the best conditions electric furnaces can be restored to production within 12 hours after charging. It may require two to three weeks to get soaking pits into full operation. Rolling mills can resume operation quickly if undamaged. Slow resumption at virtually all plants is necessitated by inspection and repair work, plus preliminary administrative actions.

The average steel consumer didn't get back to full production for six weeks following the basic steel settlement in 1946. Even though he can get steel quickly from the mill, the user needs from three to ten days before he is organized again for capacity output.

Automakers estimate that four to six weeks will elapse following the present steel strike's end before they



LONE ELECTRICIAN FIGHTS RUST IN STRUCK WAREHOUSE
. . . humidity controls protect stock at American Steel & Wire

can again assemble at full tilt. Appliance producers estimate five weeks.

Asks Board's Recall

Recall of the steel fact-finding board to clarify its recommendations on good faith, individual collective bargaining is being asked by several steel companies. The union has refused to bargain on a company-by-company basis, unless the ultimatum of noncontributory pensions and social insurance is accepted in advance.

William H. Colvin, president, Crucible Steel Co., is asking Cyrus S. Ching, director of the federal mediation service to "find out from the board itself what it actually means by good faith, individual collective bargaining."

Dr. Carroll R. Daugherty, chairman of the fact-finding board, says the board is willing to take a second look at the issue if requested to do so by the industry and the union.

Mr. Colvin believes "a way to end this strike is for the union to permit its locals the right and privilege of free collective bargaining with individual steel companies."

Other specialty steel companies support Mr. Colvin's recommendation. Superior Steel Corp., Columbia Steel & Shafting Co., Latrobe Electric Steel Co. and Babcock & Wilcox Tube Co. last week were preparing to make similar requests.

Not Pinched Yet by Strike

Current production schedules of only 15 per cent of the nation's construction equipment manufacturers are pinched by the steel strike.

This is revealed in a survey by Associated Equipment Distributors, Chicago, national trade association of the construction equipment industry.

But continuation of the strike beyond Dec. 1 probably would force a majority of the association's members to reduce present production schedules by 50 per cent or more during December. Thirty-two per cent of the manufacturers participating in the survey indicate their December production probably would not be affected. An additional 10 per cent probably would cut back less than 50 per cent.

An overwhelming majority of construction equipment manufacturers intend to continue operating at their present level as long as possible, rather than gradually curtailing production, the survey reveals.

Coal Too Costly

JOHN L. Lewis, says Harry R. McQuaid, electric steel specialist of Cleveland, has had more effect on the steel industry than anyone else.

Mr. Lewis, according to Mr. McQuaid, has increased the cost of coal so much that coke and consequently pig iron are so costly that it is cheaper to make steel in electric furnaces than in open hearths. Steel companies, Mr. McQuaid told the Metal Treating Institute, can operate electric furnaces economically enough to furnish steel in local areas such as Minneapolis and New England where scrap is available.

He contends steel mills in Birmingham are making steel cheaper with electric furnaces than big steel companies are able to produce it.

Can Continue 30 More Days

Operations of Fruehauf Trailer Co. could continue another 30 days before they would be curtailed by effects of the steel strike.

The company is working on a $9 million backlog of orders, one of the largest it has had in years.

Salaries Cut by Strikes

The steel strike is bringing on temporary pay cuts for salaried employees of steel companies.

Jones & Laughlin Steel Corp. is lowering salaries Nov. 1, the reductions ranging from 20 per cent for employees whose services will be required full time to 50 per cent for those whose services cannot be utilized during the strike. Elected officers of the company are affected also by the reductions.

Republic Steel Corp. in laying off employees not on strike is making partial payments of salaries. Half of the company's employees not on strike are not working full time.

Steel Plant Sale Postponed

SCHEDULED auctioning of steel mill facilities operated by Steel Producers Inc., in the Toronto, O., plant of Follansbee Steel Corp., previously set for Oct. 24 in Pittsburgh, has been postponed indefinitely.

Open-Hearth Plant Started

CONSTRUCTION is underway on a $12 million open-hearth plant for Armco Steel Corp. in Middletown, O. Plant will consist of three 225-ton open-hearth furnaces capable of producing 400,000 tons of steel ingots annually and is the start of a $100 million expansion program to be spread over the next few years.

Loftus Engineering Corp., Pittsburgh, designed and will build the basic brick furnaces, which will use oxygen extensively. Feature of the

Two Score Companies, Employing Total of 47,000, Sign with United Steelworkers

Forty-odd metalworking and steel producing companies have signed contracts with the United Steelworkers-CIO, granting union demands for pensions and social insurance, union officials report. Affected are 47,715 employees, representing less than 5 per cent of the union's membership in the steel and metalworking industries.

Companies which the union says have signed are:

	Number of Employees
Crompton-Knowles Loom Works, Worcester, Mass.	2,100
Lebanon Steel Foundry Co., Lebanon, Pa.	750
Connors Steel Co., Birmingham, Ala.	500
Pacific States Steel Corp., Niles & Pittsburg, Calif.	700
Judson Steel Corp., Emeryville, Calif.	300
Massey-Harris Co., Buffalo, N. Y.	2,000
Heppenstall Co., Pittsburgh	900
Central Iron Co., Harrisburg, Pa.	1,100
Kelsey-Hayes Co., McKeesport, Pa.	650
H. H. Robertson Co., Ambridge, Pa.	1,000
Adamson Tank Car Co., E. Palestine, O.	150
Ing-Rich Metal Co., E. Palestine, O.	150
Pittsburgh Coal Washer, Ambridge, Pa.	150
Portsmouth Steel Co., Portsmouth, O.	4,000
Kaiser Steel Co., Fontana, Calif.	3,500
American Can Co.	14,000
Duriron Co., Dayton, O.	500
Wickwire Bros. Co. Inc., Cortland, N. Y.	500
Pittsburgh Steel Foundry, Glassport, Pa.) Ft. Pitt Foundry, McKeesport, Pa.)	1,500
Blaw-Knox Co.	4,000
National Alloy Steel Div., Blawnox, Pa.	
Union Steel Castings Div., Pittsburgh	
Pittsburgh Rolls Div., Pittsburgh	
Lewis Foundry & Machine, Groveton, Pa.	
Roebling Wire Rope Co., Trenton, N. J.	3,500
Copperweld Steel, Glassport, Pa.	1,100
Lawson Manufacturing Co., Pittsburgh	300
Palley Manufacturing Co., Pittsburgh	200
Tracey Manufacturing Co., Pittsburgh	400
Heyl & Patterson Co., Pittsburgh	200
Pittsburgh Gear Mfg. Co., Pittsburgh	200
Pfaudler Co., Rochester, N. Y.	400
Eastern Stainless Steel Co., Baltimore	400
Lee-Norse Co., Charleroi, Pa.	100
Reliance Steel Products Co., McKeesport, Pa.	300
Kerotest Mfg. Co., Pittsburgh	250
Hanlon-Gregory Co., Pittsburgh	150
McDowell Mfg. Co., Pittsburgh	100
Tri-Lok Co., Pittsburgh	100
Union Electric Steel Castings Co., Carnegie, Pa.	50
Stanley Mining Co., Eveleth, Minn.	50
The Townsend Co., New Brighton, Pa.	800
National Radiator Co., Johnstown, Pa.	300
Parkersburg Steel Co., Parkersburg, W. Va.	365
Total	47,715

design is an elevator charging arrangement for reducing scrap charging time.

Steel Earnings Drop

Third quarter reports show effect of mid-summer recession. Profits off 10 per cent

MID-YEAR business recession is reflected in reduced third-quarter net earnings of steel producers.

Nine producers representing 70 per cent of the nation's ingot capacity earned 10 per cent less in the third quarter than in the second. Their total net earnings in the third period were $94,686,353, compared with $105,691,715 in the second quarter, as the accompanying table shows.

Only one of those nine companies reports third-quarter earnings exceeded those of the second quarter. One company shows a net loss.

Easing in demand for steel cut the nation's steel ingot production in the third quarter to the lowest rate in some time, 78.8 per cent of capacity.

Because of the high production rates of the first two quarters, 101.5 per cent in the first quarter and 91.2 per cent in the second quarter, net earnings then were sufficiently high to offset the poorer earnings performance in the third quarter and leave the total for the first nine months of 1949 well ahead of that for the first nine months of 1948.

Very little of the decline in the third quarter is a result of the steel strike, because operations in preparation for the Oct. 1 strike did not start until the last few days of September.

GM Introduces Three Diesels

INTRODUCTION of three diesel switching locomotives by Electro-Motive Division, General Motors Corp., LaGrange, Ill., constitutes its third major postwar product improvement program. New models are: 1200-hp yard switcher which supersedes the 1000-hp model in use since 1938, 800-hp yard switcher designed to cover the range of service formerly assigned to other 1000-hp switchers and a 1500-hp road switcher or general purpose locomotive.

The 1500-hp unit is in production, the 1200-hp unit will be in production before yearend and deliveries of the 800-hp switcher are planned for late next summer. The division also is now in production of the high speed 2250-hp diesel passenger locomotive announced earlier this year.

Electro-Motive Division's program for expanded locomotive production is practically complete. In 1950 it will be able to build 2000 locomotive units or more than 2.5 million hp per year. This total is double that of two years ago.

Expands Aluminum Plant

AN $8 million expansion program is under way at Reynolds Metals Co. plant at Listerhill, Ala. Completion is scheduled for Jan. 1.

Included in the expansion are installation of new foil mills to operate at a speed of nearly a mile of foil a minute, new annealing ovens, many modern high-speed processing units, two new aluminum-covered buildings giving an additional 200,000 square feet of floor space, a large cable plant for increased production of steel reinforced aluminum cable for electrical conductor, and additional rod rolling facilities, some of which were transferred from another Reynolds plant.

Publicity for Finances

Needed if industry is to withstand labor's attacks, metal trades group hears

FINANCIAL and other economic facts on business must be presented to the public if industry is to withstand attacks by labor. That was the theme of speakers at the golden anniversary convention of the National Metal Trades Association in Chicago, Oct. 26-28.

Willard F. Rockwell, board chairman of Standard Steel Spring Co., says: "The people in this country are not stupid. They are simply not informed." If a company advertises its financial and economic situation as well as it publicizes the facts about its product, Mr. Rockwell believes, the company will get far more sympathetic public support in its labor and community relations.

Common Ground for Management, Employees—Management must find a common ground with employees on economic subjects, says Walter E. Johnson, vice president of Commercial Shearing & Stamping Inc. Industry must convince employees that in any successful company the workers and the company make money with each other, not out of each other. Businessmen must convince unions that it is as "illogical to abolish capitalism because it hasn't abolished poverty as it is to abolish churches because they haven't abolished sin."

Steel Producers' Net Earnings

	3rd Qtr. 1949	2nd Qtr. 1949	3rd Qtr. 1948	1st 9 Mos. 1949	1st 9 Mos. 1948
United States Steel Corp.	$39,171,144	$44,123,595	$34,599,132	$133,223,409	$88,042,150
Bethlehem Steel Corp.	23,019,799	26,749,029	22,584,752	82,898,402	53,183,858
Republic Steel Corp.	9,870,703	10,178,544	12,874,398	35,347,875	29,812,788
Jones & Laughlin Steel Corp.	4,870,019	5,300,004	8,757,416	20,038,918	20,249,317
National Steel Corp.	10,047,905	11,115,132	11,175,400	35,916,812	27,201,435
Inland Steel Co.	7,555,103	7,033,304	9,811,133	23,842,637	24,819,526
Rotary Electric Steel Co.	115,498*	299,700	591,303	1,206,254	1,689,656
Alan Wood Steel Co.	62,920	386,565	1,109,534	1,835,172	2,383,890
Copperweld Steel Co.	204,258	505,842	1,304,188	1,425,737	3,031,384
Totals	$94,686,353	$105,691,715	$102,807,256	$355,735,216	$250,414,004
FINISHING CAPACITY ONLY					
Acme Steel Co.	$929,221	$1,111,680	$1,660,269	$3,327,749	$5,102,269
Thomas Steel Co.	203,370	257,933	403,008	929,945	1,357,492
PIG IRON CAPACITY ONLY					
Interlake Iron Corp.	$1,205,474	$1,199,842	$1,268,684	$4,162,509	$3,638,878
Sloss-Sheffield Steel & Iron Co.	403,148	512,402	639,992	1,790,891	1,778,555

* Net loss.

Outlook Good for Capital Equipment

Steel, coal strikes hit machinery sales, but fair business seen when disputes end for those manufacturers whose products will cut operational costs

STEEL and coal strikes are blocking orders for new capital equipment. End of the disputes should release a moderate flow of new business in the next year for those production machinery makers whose equipment will cut costs.

This is the outlook seen by speakers at the semiannual meeting of American Gear Manufacturers Association in Chicago, Oct. 24-26. Fred W. Walker, president of the association and executive vice president of Philadelphia Gear Works, pointed out that the index of the gear business began a trend upward in August after hitting a low point in July. He emphasized the importance of the standards activities carried on by the association and urged that engineering committees and staff facilities be strengthened to further this work.

Equipment Due for Replacement—Dexter Keezer, McGraw-Hill economist, says the industrial equipment of America is not in too good shape. A vast amount of over-age and worn out industrial machinery is due for replacement.

Highlights of the technical sessions were papers on new methods for testing heavy duty gearing, by R. P. Van Zandt and B. W. Kelley of Caterpillar Tractor Co., and on pre-shave cutting tools, by A. D. Moncrieff, Michigan Tool Co.

Tractor Methods Changed — With growing competition, tractor design and testing methods have changed greatly. Originally the machines were built as ruggedly as space and weight limitations would allow—then were run on the proving ground where numerous "bugs" came to light and were eliminated. After that customers discovered the rest of the "bugs," which the service and engineering departments corrected at much inconvenience to the customer.

Unsatisfied customers plus stiffening competition have forced basic research and scientific development into the tractor business. New designs must be right the first time. Hence the elaborate and practical laboratory test methods, even more severe than field tests but much easier to interpret. Out of these have come discoveries as to wear and breakdown of heavily loaded gears and metallurgical, design and manufacturing techniques to overcome these difficulties.

Gear Shaving Studied—A. D. Moncrieff, assistant chief engineer, Michigan Tool Co., has delved into improving the quality and speed of gear shaving—and the useful life of shaving cutters—by revising methods and tools used in cutting gears which are to be finished by the shaving methods. Heretofore the general supposition was that all that had to be done preliminary to shaving was simply to cut a gear using standard tools but leaving on the work a small amount of extra stock to be shaved off.

Mr. Moncrieff has done work in analyzing exactly what shaving cutters should be called upon to do to produce a commercially perfect gear. Then he has gone back to the preliminary cutting to discover where and how much stock should be left on for shaving—then has redesigned the preliminary cutting tools to leave on only the minimum amount and that only where it is needed to blend the working shaved areas into the other areas on the teeth.

This has resulted in a great amount of revised and special geometry, both of "roughed out" teeth and tools for roughing them out. Detailed study of this paper is recommended to all tool and production engineers who are involved in shaving of gears in mass production lots.

Foreign Business Hit

Foreign business in machine tools dropped to a low for the year in September because of European currency devaluations, but the long term effect is not yet clear. Machinery builders in general aren't climbing out on any limbs to say what will happen, but many say September's drop was due to a momentary panic.

A lot depends on the action taken by the Economic Cooperation Administration. If ECA business holds up near the $72 million originally allotted then foreign business will be normal. Should this figure be cut then the foreign market will suffer. Since ECA is committed to European reconstruction without regard to American business, some builders are uneasy.

American machinery is at a disadvantage pricewise in European markets. Even before the mass currency devaluations American machinery was higher priced than European machinery with the same rating.

Need Modern Machinery — Tell Berna, general manager, National Machine Tool Builders' Association, points out that this does not make American sales impossible. European metalworking companies are still in dire need of modern machinery. Deliveries of British machine tools are extended for a one to three year period, and most firms on the continent can afford to pay higher prices for immediate delivery and still come out ahead, he says.

Many American machinery builders also believe prices of British machine tools will go up in the near future to the point where the former differential will return. Thus the competitive position of U. S. builders will be improved.

Few Cancellations — Machine tool builders say they have had few cancellations from foreign interests but add they have no way of telling how much business was diverted to other countries that might have been theirs. D. M. Pattison, vice president-sales, Warner & Swasey Co., Cleveland builder of turret lathes, says his company has had some correspondence about cancellations. When the foreign companies found out their orders were near completion and it would cost them a sizable sum to cancel, they went ahead with their orders.

National Acme, another Cleveland firm, reports its foreign business has not been cut. This is due in part to the type of machinery it manufactures. European firms do not make machinery comparable in size and rating so National Acme is in an enviable position.

Bliss Gets Foreign Orders

E. W. Bliss Co., Detroit, has orders for rolling mills in Italy under the Marshall Plan totaling $1.3 million. The announcement is made by Marshall M. Smith, vice president in charge of foreign operations, who has returned from several months in Europe. The equipment is for cold-rolling of steel sheets. Bliss also has an order, outside the Marshall Plan, for an aluminum mill in Switzerland.

French Tool Team Coming

A French team of 18 machine tool builders is coming to the United States in mid-November to study American methods. They will visit machine tool plants in New England, Cincinnati and Cleveland as part of the President's Point Four program to give underdeveloped areas the benefit of American know-how.

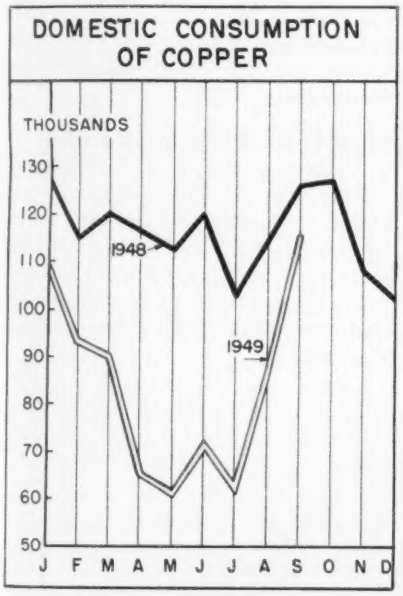
Copper, Brass Demand Up

Surge pushes copper consumption to highest monthly level since a year ago

REPLENISHMENT of inventories of copper and brass products and continued substantial demand for such goods shoved the domestic consumption of copper in September to the highest level since a year ago.

Consumption is well sustained and October figures are expected to at least equal those of September, but industrial paralysis stemming from the steel and coal strikes may soon sharply cut the need for materials and components of copper and brass.

Consumption Rises—Domestic consumption of primary and secondary copper in September totaled 114,760 net tons, a sharp rise over the 88,088 tons consumed in August, as the accompanying chart shows. This made



(Figures in thousands of tons)

the September figure the highest since last October, when consumption was 126,700 tons. Low point since last October was 61,200 tons in July.

The September surge is attributed to demand from jobbers, consumers and retailers for copper and brass products to replenish inventories that were allowed to shrink when a business lull early in the year resulted in extreme caution in purchasing.

Bookings Up—Business recovery in August, completion of vacation shutdowns, abandonment of expectations of further price reductions, a continued record-breaking production of automobiles, and a mid-year rise in house construction combined to push up the demand for copper and brass products in September. New orders booked that month by makers of copper products and copper alloy goods required 106,089 tons of copper, an increase of 39,205 tons over the 66,884 tons needed for the business booked in August.

Largest Users—The three largest users of copper and brass are the automotive, housing, and electrical industries, the high rate of activity of the first two contributing substantially to business level of the electrical group.

Despite some apprehension as to what the steel and coal strikes will do to business, producers report continued pressure from consumers for November delivery of copper. Supply for both November and December is expected to be short. Sales for November shipment are said to already equal estimated mine production.

Devaluation Brings Lower Prices

SAVINGS up to one-half the original price on contact-type welding electrodes and other products marketed by North American Philips Co. Inc., New York, are made possible by foreign currency devaluations.

The company is able to import a number of products at reduced prices from Philips Industries in Europe and will streamline its domestic manufacturing.

Reductions in domestic operations will result in the closing of the firm's Dobbs Ferry, N. Y., plant when necessary arrangements have been completed.

Part of the equipment of the Dobbs Ferry plant is being moved to other Philips plants. Picture tubes for television sets and electric shavers are other items that will be available at lower prices.

Metallic Impurities Not Dutiable

UNDER a bill passed by the House just prior to adjournment, metallic impurities—mostly lead and zinc—in imported tin ore would not be dutiable. The bill still requires Senate action.

Government Wants To Do Business with You

IF YOU shy away from federal, state and municipal business because of the complexities involved, take heart. Government purchasing personnel are streamlining their methods to attract more private suppliers.

General Services Administration, formed this summer to supervise federal nonmilitary purchasing, may decentralize into regional offices to facilitate procurement and save on an annual $1 billion goods transportation bill. So states Jess Larson, administrator of GSA who spoke before the fourth annual conference and products exhibit of the National Institute of Governmental Purchasing. The group met in Cleveland Oct. 23-26.

Centralization Helps—A centralized agency for the first time is in charge of a federal procurement program which amounts to $8 billion annually for nonmilitary supplies and services. State and municipal purchasers likewise are centralizing and simplifying their organizations to interest independent contractors more.

They also seek to cut red tape to the minimum and better educate the private supplier to cope with the procedures still necessary to get public business.

Indicative of the success of such efforts is the case in New York city which last year got only one bid for an oil and gasoline contract. This year it got seven. In New York the commissioner of purchases spends more than $1 million a week. This doesn't include buying for new building construction or for the municipally owned subway system. About 30 per cent of this total goes for metalworking products like water pipe, plumbing equipment, automotive equipment and tools of all sorts. About 20 per cent is spent for food, 15 per cent for fuel. The New York commissioner spent $55 million in fiscal 1949 which ended last June 30, $45 million in fiscal 1948, $39 million in fiscal 1947, will spend $65 million in fiscal 1950. Government budgets for purchasing have gone up in about this proportion everywhere, but now promise to level off.

ECA To Aid Small Business

ECONOMIC Cooperation Administration is establishing an inquiry and export counseling group to aid small businessmen in their export problems under the Marshall Plan.

The new service can be contacted personally or by letter. Arrangements also have been made with the Commerce Department so its 42 field offices can aid small businessmen seeking information on ECA operations. These offices can furnish names and addresses of firms abroad importing specific products.

Gas Industry Booms

Expenditures for new facilities and equipment during five-year period would total $3.5 billion

RESURVEY of anticipated construction expenditures of the gas utility industry reveals that $3.5 billion will be spent on new facilities in the five-year period, 1948-1952.

Largest single class of expenditures will be devoted to natural gas transmission equipment which is expected to account for $1.8 billion, or 52 per cent of the total gas industry outlay. Other new natural gas construction—distribution, production and storage—will amount to $1.2 billion, making a total of $3 billion for the natural gas branch.

This picture of the industry was revealed at the annual convention of the American Gas Association in Chicago.

Assets Climb—Of this five-year total, approximately $770 million was spent in 1948 and $940 million is expected to be spent during the current year. Total gas plant amounted to $6.3 billion at end of 1948 and total assets attributable to the gas utility industry reached $7.5 billion on that date.

By all standards, the gas industry stands at an all-time high in its service to the nation, says Association President Robert W. Hendee, president, Colorado Interstate Gas Co., Colorado Springs, Colo. The gas utility industry serves approximately 23 million customers, with an additional 5 million customers getting benefits of gas from the liquefied petroleum gas industry. This represents an increase of more than one million utility gas customers during the past year. Today, natural gas alone supplies nearly 15 per cent of all energy in the country.

Spectacular Growth—Spectacular growth of the natural gas branch of the industry is attracting national attention. Last year, Federal Power Commission authorized construction of 8500 miles of new pipeline, bringing the total of natural gas pipelines in the United States to 251,330 miles. Applications are now pending for an additional 14,600 miles of natural gas lines.

President Hendee emphasizes that this is an era of rapid technological and economic change, and today more than ever before research bears the major responsibility for the industry's survival and progress. The association's research program now includes 40 active projects, these covering nearly every important phase of gas production, natural gas and domestic, industrial and commercial gas utilization.

Hugh H. Cuthrell, vice president, Brooklyn Union Gas Co., Brooklyn, N. Y., was elected president of the association.

Oil Well Drilling Benefiting

OIL field equipment producers are benefiting from the fast tempo of the petroleum industry's exploration and development program.

While oil consumption averages 2900 gallons a second, oil men drill wells at the rate of one every 13 minutes. They find new producers on the average of one every 23 minutes. Older wells are passing out of existence at the rate of one every 41 minutes.

Over the past 12 years, says American Petroleum Institute, the industry drilled 200,992 producing wells in this country. In the same period, 115,442 wells reached their economical production limits, and 118,008 wells ceased their natural flow and were placed on pumps. Every time 100 new oil wells are brought into production, 57 others are abandoned and 58 more become pumpers.

Astronomical Cost: Atom Power

ASTRONOMICAL costs of building and operating atomic power plants make any rapid or large scale inroads of nuclear power into industrial power production unlikely.

That is what the American Society of Mechanical Engineers and the American Institute of Mining & Metallurgical Engineers were told at their 12th annual joint Fuels Conference at French Lick, Ind.

At most, said Ward F. Davidson, research engineer for Consolidated Edison Co., New York, nuclear power plants might represent a supplement rather than a substitute for power from oil, gas, coal and water.

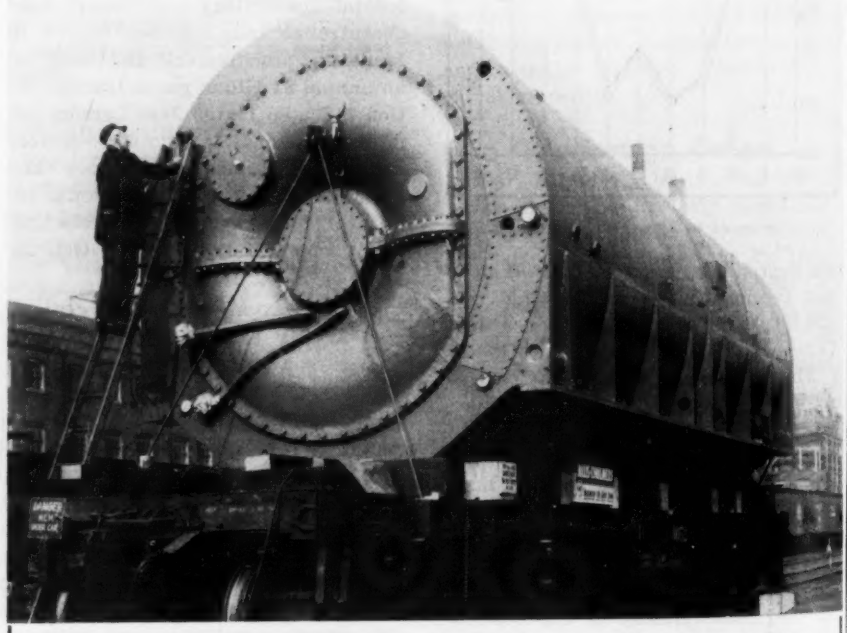
Spending $75 Million

ALTHOUGH it spent $43 million from 1945 through 1948, Pacific Gas & Electric Co., San Francisco, is spending $75 million this year on expansion of gas transmission facilities.

Largest individual project in this year's program is the 1600-mile gas pipeline being laid from northern California to Texas. The 34-inch pipe project is called the "Super-Inch" About 500 miles of the line are being laid by Pacific. Of these 30 miles are in the ground; pipe on hand is for another 20 miles. A long drawn-out steel strike will delay completion of the line, previously scheduled for early 1951.

Another Utility Program Ending

Another utility company, Peoples Natural Gas Co., Pittsburgh, has completed more than 80 per cent of its three-year, $19.9 million program to increase natural gas supplies and improve service to its more than 200,000 customers throughout western Pennsylvania.



HEAVYWEIGHT: This 375,500-pound stator for a 125,882 kva turbine generator in a large midwestern utility was one of the heaviest shipments in Allis-Chalmers' history. It had to be shipped on a special high-capacity freight car. Measuring 29½ x 13½ ft, the stator was completely sealed for shipment

More U. S. Imports from Europe Vital

ECA warns that U. S. must import $2 billion more goods a year from Western Europe if that area is to survive economically. Agency hits American, foreign red tape

UNITED STATES must import $2 billion more goods a year from Western Europe if that area is to survive economically. European government and business leaders are giving unusual attention to the Economic Cooperation Administration study which sounds this warning.

In a report of an investigating mission to Marshall Plan nations, ECA denounces this country's "antiquated and in some cases inequitable customs procedures" and "prohibitive" tariff rates. The report demands correction of these impediments and removal of oppressive controls imposed by governments of exporting nations. It hits the federal "Buy American Act" and local preference procurement legislation of 22 states.

Criticizes Europeans — The report criticizes European producers and exporters for their failure to make more aggressive selling efforts in the U. S. and European governments for depriving exporters of the incentive needed for sustained effort by forbidding them free use of part of the dollars thus earned. ECA points out that the present $6 billion annual gap between American exports and imports cannot be financed much longer by the American taxpayers through ERP and World Bank loans.

ECA believes that the problem can be partly solved by "stimulating an expansion of exports from other countries to the U. S., accompanied by an expansion of U. S. foreign investment." The $2 billion of increased annual imports from abroad is suggested only as a realizable figure. U. S. imports from ERP countries in 1937 totaled $1823 million, or 2 per cent of this country's gross national product. In 1948 the value of imports from the same sources increased to $3167 million but this dropped to only 1.2 per cent of the U. S. gross national product.

U. S. Tariff Battle Feared—Not discussed in detail in the report is the general agreement on tariffs and trade negotiated at Annecy, France, last summer. The U. S. in this pact promises to cut some of its tariffs as much as 50 per cent. Europeans fear that this could be one more match to ignite a new tariff battle in Congress next year. They wonder if the U. S. government went too far; they are acutely conscious of the strong pro-tariff sentiment in America.

IN RED SHANGHAI: Chinese workers are turning out railroad spikes for use in building more rail lines to bring more coal into Shanghai. Reds don't seem to mind that the automatic hammer comes from "decadent" Western nations and is a fruit of capitalism. NEA photo

Belgium Opens Chicago Show

Belgium has opened what may become a permanent trade exhibit in Chicago to attract American dollars. More than 200 Belgian manufacturers participate in the show.

All Benelux producers need the business, for the area is in the grips of a severe recession aggrandized by devaluation. Belgium devalued only slightly; now the country is being flooded with foreign goods, particularly from Britain.

The nation is as dependent upon exports as Britain. To bolster lagging sales, she is wooing Belgian Congo markets more assiduously and has cut the price of steel. Steel bars for Sweden now sell for $68 per metric ton, f.o.b. Antwerp. The former quotation was $90.

Frozen Funds Thaw in Ruhr

Ban on foreign investments in Western Germany has been partly lifted by a new order permitting liquid funds in Germany owned by foreigners to be unblocked and reinvested in German industry. This step is hailed as a prelude to the lifting of the embargo on new investment funds from abroad.

Steel exports are improving slightly. Only 42,000 tons of rolling mill products were exported all last year, but in the first half of 1949 nearly 194,000 tons were shipped abroad. About 30,000 tons monthly have been sent overseas thus far in the second half. Germany's total steel exports in 1936 amounted to 2 million tons.

Heaviest competition rages in the Near East, particularly between France and the Ruhr. German steelmen are complaining at French overexpansion in steel. They charge that the Sollac project in France to produce 300,000 tons of tin plate annually is unjustified, that the Ruhr traditionally has supplied tin plate for continental Europe.

U. K. Americanizes Sales

British metalworking companies are modifying their sales techniques to get more American markets. Automakers are boosting their advertising budgets to publicize the new low prices in the U. S. New sales offices in this ocuntry are being opened by large English firms. American export and import agents note increased inquiries from the United Kingdom regarding representation.

Producers of tubular products, automotive equipment, locomotives and power plant apparatus account for 40 per cent of all British export trade. Autos will be pushed the heaviest of all metalworking items in America. Total auto exports in the first half of this year totaled 100,112, of which the U. S. received 3084, compared with the 8285 received in the same period last year. British auto production promises to hit alltime highs in 1949 as the industry gets more and more steel; 196,709 cars were assembled in the first half, compared with 169,956 in the same period of 1948.

Russian Output Gains

The Soviets say their gross production this year is running 20 per cent ahead of last year, employment is up by 2 million and fulfillment of the current Five-Year Plan by the end of the fourth year, Jan. 1, 1950, seems assured.

In industry, the best individual records on the fulfillment of plan quotas were made by heavy machine building and the light metal industries, with 107 per cent. Coal production was 102 per cent of the quota, oil 105 per cent, agricultural machinery 98 per cent.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor,* STEEL

Agreement for settlement of government suit against steel industry's former pricing system drawn up by defendant steel companies in collaboration with FTC attorneys

LOOK for a softening in the Federal Trade Commission's attitude toward freight absorption. The philosophy that f.o.b. mill pricing is the only method for which a 100 per cent defense can be justified has gone in the discard. Recent testimony by commission spokesmen on the O'Mahoney freight absorption bill made it clear that a majority group in the commission recognizes the legality of freight absorption when it is done independently, in good faith, to meet competition, and not for the purpose of materially lessening competition.

Liberalized Policy Expected—More liberal policy toward pricing methods is expected to be revealed over the next few months in four decisions that are coming up. These decisions, it is learned on Capitol Hill, may have a powerful bearing on what the Senate will do on the O'Mahoney bill next year. If the commission shows by these decisions that it can administer the existing laws so as to permit needed pricing flexibility, Senate proponents of the freight absorption bill may conclude that remedial legislation should be abandoned or postponed.

Reflects Current Thinking — The way the wind is blowing is reflected in the deal now under discussion between commission and respondent attorneys in the case against the former multiple basing point, delivered-price system in steel. Under the proposed settlement, steel mills would have to quote f.o.b. mill prices and be willing to sell at those prices when so requested by the consumer; they could absorb freight "excepting when such freight absorption unlawfully lessens competition;" and each steel producer would fix his own extras without reference to the rest of the industry.

Must Have FTC Approval — The above represents the highspots of the proposed agreement for settling the steel pricing case. While steel companies have accepted such a settlement, it still will have to be approved by the commissioners. But the mere fact that the deal has progressed to this stage demonstrates a great liberalization in commission staff thinking.

Decisions are due also in the important lead and chain cases. The lead case, involving zone price fixing, was brought under the Clayton and Federal Trade Commission Acts. The chain case involves three kinds of pricing, a Pittsburgh plus type system, a basing point and freight equalization system, and a flat zone system; this case also was brought under both Clayton and Federal Trade Commission Acts.

Then there is the Corn Products Refining case, involving basing point price fixing. Reargument on respondents' motion to dismiss is slated for December.

Hope To Keep Authority — Being human, the commissioners, when considering these cases, will be keenly aware of the fact that the O'Mahoney bill, already passed by the House, stands an excellent chance of going through the Senate unless the commission gives positive proof, in the meantime, that the remedy can be obtained through more liberal and realistic administration of the Clayton and Trade Commission Acts as they now stand. The commissioners realize that the bill as it came from the conferees, and as it passed the House, would virtually strip the commission of authority over pricing methods—and they wouldn't like that.

Decisions in these four cases will be important also in reflecting the composite thinking of the reconstituted commission, which now includes two new members, John Carson and a former senator from New York, James Mead. Other members are Lowell B. Mason, acting chairman, and William A. Ayres. The fifth member, Ewin L. Davis, died Oct. 23.

No Check on Spending

RESIGNATION of Dr. Edwin G. Nourse as chairman of the President's Council of Economic Advisers because he was sick of the administration's spend-and-control policies will have no effect in checking this program.

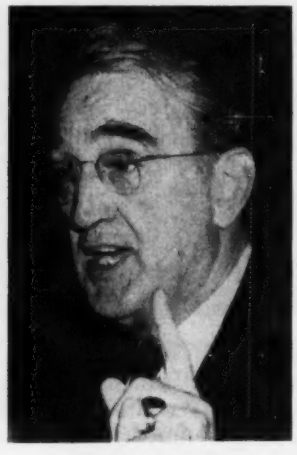
He will not be missed at the White House. Long ago he learned that his views did not click with the President. In recent months Leon Keyserling has been given credit for being chief economic adviser to the President.

Dr. Nourse's resignation recalls the time, in 1934, when Lewis W.

Members of the Federal Trade Commission

WILLIAM A. AYRES

JOHN CARSON



JAMES M. MEAD

LOWELL B. MASON

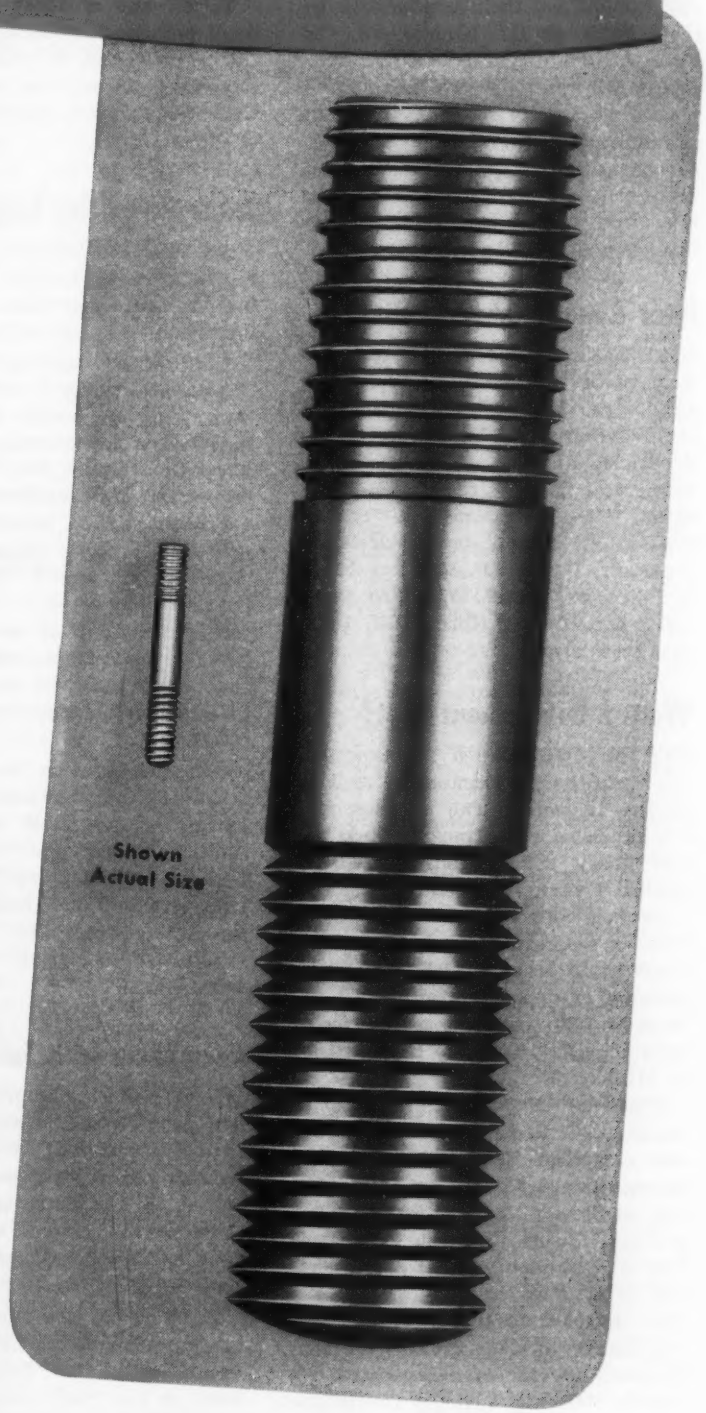
They're both LOK-THRED

NOW . . . get Lok-Thred's greater strength . . more positive locking action . . in *any* size stud, bolt or screw

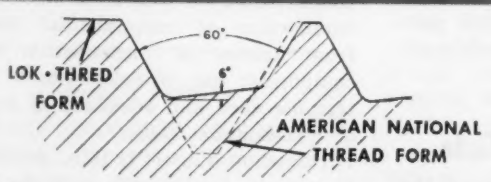
Are you making full use of LOK-THRED'S proved advantages—and its availability in any size or type of threaded fastener?

The revolutionary LOK-THRED design locks securely and becomes tighter in service . . . has much higher fatigue limits and is stronger in both tension and torsion than ordinary American National Threads...does not require selective fits.

These and other LOK-THRED features may offer important application advantages in your products. For full information, write for LOK-THRED booklet, today.



SEE THE DIFFERENCE!



Note Lok-Thred's larger cross section . . . and flat root surface instead of a relatively sharp "V" . . . as compared to the American National Thread form. Here's the secret of Lok-Thred's greater strength.

National HEADED AND THREADED PRODUCTS

THE NATIONAL SCREW & MFG. CO.
Cleveland 4, Ohio

Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 So. Garfield Ave., Los Angeles 22, Cal.

Douglas, now ambassador to Great Britain, quit as Franklin D. Roosevelt's director of the budget. He made a nuisance of himself by objecting to the heavy deficit spending under Roosevelt. Net effect of his resignation was to remove an obstacle in the path of the spenders.

It's probably no exaggeration to say that if all the brass hats in the government let their consciences be their guide as Dr. Nourse did, the present administration would practically fall apart. Active newspapermen know that many government administrators privately are not in agreement with Truman policies. But when you work for the administration, you follow the White House line—if you want to hold your job.

Inter-American Affairs Bureau

INCREASING importance of relations with the other American republics has led to State Department organization of a Bureau of Inter-American Affairs. It is headed by Edward G. Miller Jr., assistant secretary for inter-American affairs, Willard F. Barber, deputy assistant secretary, William P. Hughes, executive director, Ivan B. White, economic and labor adviser, Norman M. Pearson, staff assistant.

Want a Government Post?

WOULD YOU take a top executive job with the government if it were offered to you? The salaries now are much more attractive than before; they range from $22,500 to $15,000 a year. The schedule:

Cabinet officers $22,500, up from $15,000; secretaries of armed services $18,000, up from $14,000; undersecretaries of departments $17,500, up from $10,330; assistant secretaries of departments $15,000, up from $10,000 to $12,000.

Positions of special interest to business: Chairman Munitions Board and chairman Research and Development Board $16,000, up from $14,000; chairman National Security Resources Board $17,500, up from $14,000; solicitor general and assistant to attorney general, $17,500, up from $10,330; federal mediation and conciliation director $16,000, up from $12,000; director of aeronautical research, National Advisory Committee for Aeronautics $15,000, up from $10,330; Federal Trade commissioners, Federal Power commissioners and Federal Communications commissioners $15,000, up from $10,000; Interstate Commerce commissioners $15,000, up from $12,000; National Labor Relations Board members $15,000, up from $12,000; undersecretaries of Army, Navy and Air Force $15,000, up from $10,330; RFC chairman $16,000, up from $15,000; RFC directors $15,000, up from $12,500; Maritime Commission chairman $16,000, up from $12,000, Maritime Commission members $15,000, up from $10,000.

To fill any of these jobs government personnel officers consider only the upper crust of businessmen or industrial executives receiving, or who have received, salaries of $25,000 or more.

Labor Rules Not Easy To Make

NEW REGULATIONS to carry out amendments to the Fair Labor Standards Act are under study by the Wage and Hour Administration.

Because of wording of the new legislation writing of rules will not be easy; they are slated for announcement when the new amendments take effect in January. One gives the administrator new, limited power to sue for back pay on behalf of workers possessing such claims. Another covers only workers "directly essential" to production, in contrast with former coverage of workers "necessary" to production; expectations are that court decisions will be required to establish the meaning of "directly essential."

Other changes in the new amendments tighten child labor restrictions, exempt more retail establishments such as laundries. They exempt forestry and logging workers; air transport and fish cannery workers are exempt from the overtime provision but not from the minimum wage floor.

Compliance with Safety Code

WIDESPREAD compliance with the new code for safe loading of steel on motor trucks and truck trailers is indicated by reports and inquiries received by the Interstate Commerce Commission's Bureau of Motor Carriers and by the American Trucking Associations Inc., Washington.

Both offices are furnishing copies of the code on request. It includes specifications for bulkheads to be built on the front ends of trailers so a steel load will not slide forward and kill the driver if there's an accident. The code calls for marking all motor carriers by Nov. 1 with the maximum safe steel loading capacity, and completion of bulkhead installations by Jan. 1.

Minerals Bill Held Up

CONTROVERSIAL O'Mahoney National Minerals bill, passed by the Senate, will come up in the House next year.

This is the measure which would authorize spending of $400 million over five years to aid marginal miners and to prevent idle copper and other mines from being flooded and their remaining deposits lost. The bill, pressed by the interested mining companies, has administration acquiescence but no administration support. It would be a difficult bill to administer because it would put the interior secretary in the position of having to decide which mines are qualified for assistance. Some opponents of the bill say it would be an entering wedge for government control of the mining industry.

Fewer Weapons if War Comes

IF ANOTHER war comes, industry will be asked to make fewer types of weapons than in World War II.

This is indicated by a preliminary report to the army secretary by an Army Equipment Policy Board headed by Lt. Gen. Raymond S. McLain. It recommends: Reduction in number and types of individual weapons and equipment; reduction in kinds of ammunition; fewer types and less variety in caliber of guns; stabilization of design of major items of equipment; reconsideration of replacement factors; replacement of administrative vehicles in posts and camps by commercial-type vehicles; use of commercial-type cargo vehicles in the communications zones of theaters; elimination of non-essential items from tables of organization and equipment; use of field tests to determine need and adequacy of items of questionable value.

The whole subject is to be reviewed further at a conference in November.

Stockpiling To Be Stepped Up

STOCKPILING of strategic and critical materials will be stepped up this year.

The Munitions Board emerged from the appropriation mill with cash of $315 million and contract authority of $420 million for fiscal 1950. This compares with $225 million cash and $300 million contract authority in fiscal 1949. Attempts to put strings on the board fell through. It still has freedom to place long-term contracts and to use its own discretion in deciding what material should be bought at home or abroad.

Suggestions Pay Off

Delegates to National Association of Suggestion Systems meeting study successful plans

COST cutting with a bonus in better employer-employee relations can be gained from a properly administered suggestion system. Delegates to the annual meeting of the National Association of Suggestion Systems in Cleveland Oct. 24 and 25 heard this idea upheld by representatives of companies who have used the plan successfully.

They were told that in suggestion systems: 1. Details of the plan must be outlined to employees and a definite procedure pursued; 2. monetary compensation is an important factor in a successful plan; 3. other recognition such as announcements on bulletin boards and in house organs are equally important; 4. in event a suggestion is not used the employee should be told why it was rejected; and 5. system should be tailor-made to fit the individual plant.

Companies using suggestion systems in 1949 paid out more than $2.3 million for the 134,000 suggestions adopted. The 12 top awards earned over $68,000 for those who suggested them. Largest single award was made by Cleveland Graphite Bronze Co. and paid the employee $12,104.

The investigators suggest the need for further study by participating companies into the matter of maximum and minimum awards. Both types of awards should be arrived at scientifically and not set arbitrarily.

Association officers to serve this year are: President, F. W. McMenimen, Public Service Electric & Gas Co., Newark, N. J.; vice presidents, S. W. Rubenstein, Philadelphia Electric Co., Philadelphia, and J. L. McVittie, Eastman Kodak Co., Rochester, N. Y.; secretary, A. W. Egner, Swift & Co., Chicago; and treasurer, G. H. Thobaden, Cleveland Graphite Bronze Co., Cleveland.

Human Frailty

CHIEF METALLURGIST Howard E. Boyer of American Bosch Corp., Springfield, Mass., relates this story about customer relations:

Whenever a die cracked, a commercial heat treater he knows always had a good reason to tell his customers why it was not his fault. He always ended up paying the bill. But he has changed his tactics.

Now he goes to the customer, tells him he had an accident and asks what he should do about it. The customer often admits he has accidents too. Almost invariably the heat treater satisfies the customer by heat treating another die free.

IBM Expands Foreign Sales

ENLARGEMENT of International Business Machines Corp.'s market is announced by Thomas J. Watson, board chairman. Contract with British Tabulating Machine Co. that gave the British firm an exclusive license to IBM's accounting patents in the British empire with the exception of Canada has been canceled by mutual consent.

Growth of IBM's foreign business has resulted in formation of IBM World Trade Corp., a wholly owned but independently operated subsidiary, to handle all business outside the United States.

National Safety Awards

BETHLEHEM and Republic Steel corporations shared five of the nine awards to steel mills, traditional leaders in safety among heavy industries, in the metals section contest conducted annually by the National Safety Council.

Bethlehem swept the first three awards for largest steel mills in the year-long contest. The Johnstown, Pa., Lackawanna, N. Y., and Bethlehem, Pa., mills finished in one-two-three order. Republic's Canton, O., mill took first place in the next size group; Gulfsteel works of the company in Gadsden, Ala., finished third. National Tube Co. won second place.

Among smaller mills, first three awards went to: 1. American Steel & Wire Co.; 2. Copperweld Steel Co.; 3. Follansbee Steel Corp.

Gulf Research Lab Dedicated

GULF Research & Development Co., a subsidiary of Gulf Oil Corp., Pittsburgh, dedicated its oil prospecting research laboratory to Frank Adair Leovy, a pioneer advocate of scientific oil exploration.

The Leovy Laboratory of Geophysics is the largest of 40 buildings erected on a 57-acre research tract just outside Pittsburgh. S. A. Swensrud, president of Gulf Oil, dedicated the building. One feature of the completely air-conditioned building is a two-inch "lake" atop the building.

CALENDAR OF MEETINGS

Oct. 31—Nov. 1, American Machine Tool Distributors' Association: 25th anniversary meeting and banquet, Hotel Gibson, Cincinnati. Office of the secretary is at 505 Arch St., Philadelphia 6.

Oct. 31-Nov. 2, Packaging Machinery Manufacturers' Institute: 17th annual meeting, at Edgewater Beach Hotel, Chicago. Institute headquarters are at 342 Madison Ave., New York.

Oct. 31-Nov. 3, American Institute of Steel Construction: Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute headquarters are at 101 Park Ave., New York.

Nov. 1-5, Pacific Chemical Exposition and Pacific Industrial Conferences: Running concurrently at San Francisco Civic Auditorium.

Nov. 2, American Iron & Steel Institute: Fifth regional technical meeting at the Waldorf-Astoria, New York.

Nov. 2-4, American Society of Civil Engineers: Fall meeting, Washington. Society headquarters are at 33 W. 39th St., New York.

Nov. 3, Society of Advancement of Management: Annual banquet, Hotel Statler, New York. Society headquarters are at 84 William St., New York.

Nov. 2-4, Industrial Management Society: 13th annual time and motion study clinic, Sheraton Hotel, Chicago. Society public relations headquarters are at 176 W. Adams St., Chicago.

Nov. 2-4, American Society of Civil Engineers: Fall meeting, Washington.

Nov. 2-4, American Society of Body Engineers: Fourth annual technical convention, Rackham Memorial Building, Detroit.

Nov. 2-4, Triple Mill Supply: Meeting of presidents, secretaries, convention and executive committees of American, Southern and National associations, at the Homestead, Hot Springs, Va. Headquarters of American Supply & Machinery Manufacturers' Association are at 1108 Clark Bldg., Pittsburgh.

Nov. 2-5, Mechanite Metal Institute: Annual meeting, Hotel Carter, Cleveland.

Nov. 3-4, Metals Casting Conference: Sponsored by Purdue University, Lafayette, Ind.

Nov. 7-8, Conference on X-ray and Electron Diffraction: Mellon Institute of Industrial Research, Pittsburgh.

Nov. 10, American Iron & Steel Institute: Sixth regional technical meeting, at the Mark Hopkins Hotel, San Francisco.

Nov. 10, Purchasing Agents Association of Chicago: Meeting, Hotel Sherman, Chicago. Association headquarters are at 134 N. LaSalle St., Chicago.

Nov. 10-11, American Management Association: Meeting on industrial cost reduction, at Palmer House, Chicago. Association headquarters are at 330 W. 42nd St., New York.

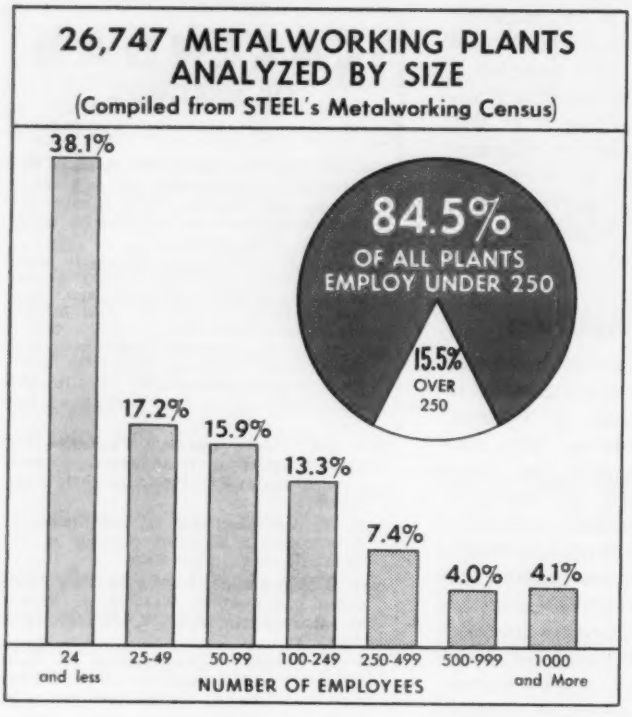
Nov. 10-11, National Foundry Association: 51st annual meeting, Waldorf-Astoria Hotel, New York. Association headquarters are at 120 S. LaSalle St., Chicago.

Nov. 10-11, National Symposium on Air Pollution: Sponsored by Stanford Research Institute in co-operation with California Institute of Technology, University of California and University of Southern Calif., Huntington Hotel, Pasadena, Calif.

Nov. 14-18, Refrigeration Equipment Manufacturers Association: Sixth refrigeration and air conditioning exposition, at Atlantic City Auditorium, Atlantic City, N. J. Association headquarters are at 1346 Connecticut Ave. N. W., Washington.

Nov. 16-18, Industrial Hygiene Foundation: 14th annual meeting, Mellon Institute, Pittsburgh.

Nov. 25-26, American Foundrymen's Society: New York regional conference, Syracuse University, Syracuse, N. Y. Society headquarters are at 222 W. Adams St., Chicago.



Small Companies Face

Puzzling Pension Problems

Steel fact-finders' report accelerates unions' welfare drive. May catch little manufacturer unprepared. Co-operative studies, joint plans may hold advantages for small employer

SMALL metalworking companies will have to face up to the pension problem much sooner than they believed a few months ago. Many small employers thought that it would be years before they would be confronted with decision as to what to do about union demands for retirement benefits. Some thought the problem never would filter down to the little fellow.

The steel fact-finding board's report and its prosecution by the unions have changed all that. As soon as the pension dispute is settled in the big companies, unions will press demands against small business.

Don't expect too much consideration because you are small. Nor will ability to pay be accepted as a criterion. Witness CIO President Philip Murray's statement at Youngstown Oct. 11: If a company can't afford pensions, it shouldn't be in business.

Big Problem for Little Manufacturer

In many respects the pension problem of the small employer is more serious than that of the larger companies. His costs in terms of cents per man-hour may be higher because he may not have enough employees to qualify under some of the more desirable, low-cost plans.

And there are a great many more of the smaller companies. Take a look at these figures from STEEL's census of the metalworking industries. Of a total of 26,747 plants, 4137 employ more than 250 persons, but 22,610 employ fewer than 250 persons. See accompanying chart for breakdown by employment groups.

Large companies retain independent actuaries and pension consultants to study their situation, analyze data on employees' ages, sex, race, earnings and past service, and to make recommendations on the type of plan best suited to the conditions of the employer.

Can the little fellow do the same? The cost per employee of such a study ordinarily will be greater for the small company. Much of the work the consultant does will be necessary no matter if the company has 250,000 employees or 25. A company employing 250,000 may pay a $25,000 fee to a pension consulting firm and the cost per employee is only 10 cents. If the employer of 25 persons pays a $1000 fee, the cost per employee is $40.

Co-operative Action Suggested

This poses an obvious problem. One solution being considered by small companies is a co-operative study of the problem and possibly co-operative plans.

Pension consultants believe a group of small companies in similar business and having fairly comparable labor forces can join in financing a joint study of their pension problem by a competent and independent pension consultant. This would make possible one study covering the total pension problem.

After the facts are analyzed and the various types of plans suitable for the co-operating companies explored, each company is free to consider the desirability of establishing its individual plan. The co-operating companies might go further and establish a joint framework into which each company's individual plan could fit.

Two Advantages Possible

Two advantages would result: 1. The per capita cost of making the study and recommending a plan would be lower. 2. A joint pension framework could result in the adoption of a more desirable type of plan—one which would not be feasible for any one of the small companies by reason of the limited number of employees.

Sixty-two New York savings banks with an average employment of 45 adopted such a co-operative plan in 1941 and established a self-administered plan which would not have been practicable for any one participating member. Seven Vermont banks with a total

of 97 employees, or an average of about 14, set up a co-operative plan in 1947. In the state of Washington, 15 banks with a total of 146 employees established a co-operative plan in 1948.

Under insured or under self-administered co-operative plans, each company retains its identity and each bears its own fair share of cost as determined by the makeup of its employees—their ages, service, etc. Grouping permits a sharing of mortality experience. Often benefits under a co-operative plan follow the same formula.

Suppose a group of 15 small companies whose employment aggregates 600 persons, or an average of 40, embarks on a co-operative study. First step should be to retain a competent, independent consultant to conduct a study of their problems. Fees for such service may vary widely, but a fair figure for a group of this size might be in the neighborhood of $1500 to $4000, depending on the amount of work required. Thus the cost per employee would fall within a range of $2.50 to $6.50.

Consultant Would Direct Study

The consultant would ask for detailed data on employees of each co-operating company, including birth date, employment date, rate of pay, sex, and color. These would be analyzed for each company.

After these analyses are completed and a report transmitted to members, a general meeting of the co-operating companies and the consultant would follow. The consultant, on the basis of the analysis of the employment data, financial history and outlook of the companies and the size of the benefits desired, would outline the most advantageous plans.

Should the study indicate that advantages should accrue to the co-operating companies by pooling their plans within a common framework, yet each maintaining its identity, this project could be explored further by the companies and the consulting firm. Should the companies wish to establish separate plans, this could be done on the basis of the study, with the consultant indicating what type of plans would be best suited to the conditions revealed by the study.

What Types of Plans Are Available?

First major breakdown of types of pension plans is into insured or uninsured plans.

Insured plans usually use the facilities of a commercial insurance company. Types available:

1. Individual contract, in which the employer makes an annual contribution to a trustee who buys an insurance policy for each employee to provide a unit of retirement income at a specified age. About 60 per cent of pension plans now in effect are based on individual contracts; they cover only about 6 per cent of the total participants covered by private pension plans. The number of participants covered is usually small and averages about 50. Usually it is used to cover salaried and executive personnel rather than hourly-paid workers. Fringe benefits included make it rather expensive for covering wage earners.

2. Group permanent is somewhat similar to the individual policy but uses group practices. A minimum of 25 to 50 employees covered usually is required.

3. Group annuity plans involve a master contract between the company and insurance carrier providing for the purchase each year of a specified unit of ultimate pension to be provided for employees. Usually a minimum coverage of 50 employees is required and the national average coverage is 600. It cannot easily be used where a flat benefit payment is desired.

4. Deposit administration is a plan under which an insurance company agrees to handle the pension fund for the employer on a typical self-funded basis until retirement of employee. At retirement, the funds ordinarily are used to purchase single premium annuities. Usually this plan requires a minimum of 500 or 1000 employees. It may be adopted for use by the small companies under a co-operative plan.

False Move at Outset May Prove Costly

Uninsured plans are known as trusteed, self-funded, self-administered or self-insured. A trust is created and the employer periodically contributes what is needed to maintain the plan on an actuarily sound basis. Average coverage under these plans is about 2900. If used by small companies, co-operative action might be desirable.

Complexities of pension planning are myriad. The long-range cost of financing pension programs runs into tremendous figures. A false move in setting up a program may prove hazardous or even ruinous.

You should not only know and appreciate the impact of pension costs on your company, but also their relationship to those of your competitors.

Smaller companies must approach the pension problem with the same or greater care and responsibility as the larger companies.

COVERAGE OF PENSION PLANS
Compared by Periods They Became Effective

Period Plan Became Effective	Percentage of Employees Covered Per Company	Average Number Per Plan
PRIOR TO 1930	77.7%	13,278 PARTICIPANTS
DURING 1930-1939	40.6%	1,026 PARTICIPANTS
DURING 1940-Sept. 1, 1942	20.9%	534 PARTICIPANTS
DURING Sept. 2, 1942-1944	20.0%	170 PARTICIPANTS
DURING 1945-1946	24.4%	169 PARTICIPANTS

Prepared by Willard A. Weiss, Eugene M. Klein and Associates

Average number of participants in pension plans decreased sharply from the 1920s through 1946. After passage of the Social Security Act and particularly during the war, percentage of total employees covered by pension plans dropped as more plans were restricted to salaried and executive personnel. Average employment in companies adopting pension plans before 1930 was 17,300. Average employment for companies adopting plans in 1945 and 1946 was 690, indicating a sharp increase in plans among the smaller companies.

The weight's in the load and not in the truck when frames, body panels, fenders, wheels and other truck structural parts are made of N-A-X HIGH-TENSILE. And while affording weight savings of up to 25% in section, the high physical properties of N-A-X HIGH-TENSILE insure superior strength and increased resistance to fatigue, corrosion, abrasion and denting.

This decrease in deadweight decreases on-the-job expenses, too. Trucks built with N-A-X HIGH-TENSILE consume less gasoline . . . require less maintenance . . . give longer service. And the excellent formability, weldability, and fine surface texture of N-A-X HIGH-TENSILE mean that you build them better, with no added fabricating problems.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N·A·X
HIGH-TENSILE STEEL

GREAT LAKES STEEL CORPORATION N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
Unit of National Steel Corporation

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Record year in auto assemblies certain despite the steel strike. Output will fall sharply in November and December when many makers change models

DETROIT

CAR and truck assemblies were due to cross the 1929 peak last Wednesday but the big push for this year is over and output will taper off sharply in November and December. Model changes will be at a leisurely pace and while some plants have sufficient steel to make a start on 1950 designs they cannot continue more than a couple of weeks. Settlement of the steel strike will not help much, since virtually every pound of material in inventory is being consumed, and the consensus is that it will take four to six weeks to bring stocks up to the proper balance for steady production.

GM in Best Shape for Steel

General Motors appears in somewhat better position on steel than Ford and Chrysler, and its divisions are hoping to maintain production at least on a four-day work week. Some shifting of steel supplies from one division to another may be necessary to keep operations going. Pontiac will run out its 1949 models this week and reportedly has enough material for about three weeks of 1950 model assemblies. Chevrolet will conclude the current series next week and then change over to the new design. The plan apparently is to offer regular and deluxe types, the latter to have a higher horsepower engine and a torque converter transmission as optional.

Buick will not change its special series which currently accounts for over 50 per cent of total production, but there will be new body styles for the Super and Roadmaster. The former will use the same basic body shell as the present special, while the Roadmaster will feature a completely new body of the so-called "C Series," to be used by Cadillac as well. There may be some delay in the introduction of this body because of the steel tieup.

Chrysler Lines Soon Down

Chrysler assembly lines probably will be stopped at the end of this week to mark time until steel shipments are resumed. It may be possible to continue Plymouth production a little longer, but Chrysler, Dodge and DeSoto will be forced to suspend. Tooling for body changes is fairly well along and the assembly shutdown could provide the opportunity to make equipment changes involved in setting up for the models.

K-F Closes After RFC Deal

Kaiser-Frazer last week terminated most of its production and assembly activity, laying off approximately 5000. No reason was given for the move, although it is likely related to the new financing which the company is arranging. The RFC has approved loans totaling $44.4 million, of which $10 million is to be made available to the Kaiser-Frazer Sales Corp. which in turn will make loans to dealers unable to arrange credit for new car shipments through conventional financing channels. The company had asked for $15 million for this purpose, but the sum was scaled down by one-third by the lending agency. Money drawn from the fund must be repaid in 18 months, with interest at 4 per cent. The RFC has placed a number of conditions on the other loan, of which $22.4 million will be used for engineering and tooling, and $12 million for working capital. Among them are a first lien or mortgage on the Willow Run plant and other property valued at $58 million and a $15 million guarantee secured by collateral worth $10 million.

The RFC last week released an unusually detailed statement covering the K-F loan, apparently in answer to critics who had charged the agency with favoritism to the Kaiser interests. The chairman of the RFC pointed out that Mr. Kaiser and his family and companies in which they are interested own less than 10 per cent of the corporation's stock. There are approximately 40,000 shareholders at the present time.

Ford Keeps Up Steel Output

Ford will keep production moving in its steel mill division, despite suspension of manufacturing and assembly on Nov. 11 and 15, respectively. Supplemental fuels are being used at the Rouge Plant to conserve steam and coking coal, and the cycle time of coke ovens has been doubled in order to stretch supplies to match available steel. Open-hearth furnaces were shut down Sept. 23 while a number of major repairs were being made in the blooming mill and hot strip mill. They resumed Oct. 14 and are now back in full production.

HOUSE ON WHEELS: Latest adaptation of the Ford F-3 forward control truck chassis is the Tour Wagon, veritable house on wheels. Developed by a leading commercial body builder, this innovation in motorized touring can be turned out on a production-line basis

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

turning out about 17,000 tons of ingots weekly. The Ford mill produces about 50 per cent of total steel tonnage requirements but cannot meet the balanced requirements necessary to continue manufacture of cars and trucks, due to the varying shapes and sizes involved. The company anticipates that it will be able to maintain the manufacture of service parts in sufficient volume to meet most demands.

Ford had planned to show 1950 models here around the 17th but doubtless will have to defer the unveiling until the steel picture clears. State fairgrounds was being considered as the site for the showing.

Ford sales manager J. R. Davis recently told an Atlantic City audience that careful study currently is being given to what extent factory schedules will have to be tapered off to meet the potential of the 1950 market for automobiles. He "guessed" the 1950 sales total might run as much as 10 per cent behind 1949, and added that the industry will be shooting at the 1949 record for as long or longer than it took to top the 1929 total.

Ford Markets House on Wheels

A NEW type of house on wheels, called a Tour Wagon and designed by a leading commercial body builder, is now available through Ford dealers. Ingeniously arranged to provide a three-room apartment-in-one, the vehicle is mounted on a forward-control parcel delivery chassis, in either 104 or 122-inch wheelbase. Interior height from floor to ceiling is 71 inches, width 6 feet 2 inches and length 15 feet. With the steering gear mounted ahead of the front axle, space ordinarily required for the hood and fender wells becomes available for passenger and storage room.

In the driving compartment are two special armchair seats equipped with built-in shock absorbers. A bedroom-dining room combination just aft of the driving compartment serves a triple purpose. On either side are 48-inch lounge seats and between them a 4-foot wide drop-leaf table. En route, passengers may lounge, nap or view the scenery from this point. At mealtime the table seats as many as seven and at night it drops down to bed height. Rubber seat cushions form a comfortable double bed, and bunk space is provided for two more.

Equipment includes a regular galley stove, a refrigerator capable of keeping 150 pounds of food and beverages chilled for two weeks, a kitchenette with a 14-gallon tank sink and work space, all in stainless steel. There are 20 cabinets and drawers conveniently placed yet out of the way. Wardrobe facilities accommodate ten suits of clothes, an 11-foot folding canvas boat, plus shoes and fishing tackle. Chemical toilet and lavatory are enclosed in a separate compartment across from the clothes closet. The doors of these rooms form a private dressing room, shut off completely from the front of the vehicle. A special shower bath tank which can be heated on the stove is mounted above the right front entrance, permitting a hot shower to be taken behind a snap-on curtain in complete privacy.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1949	1948
January	445,092	422,236
February	443,734	399,471
March	543,711	519,154
April	569,728	462,323
May	508,101	359,996
June	623,689	454,401
Six mos.	3,134,055	2,617,581
July	604,351	489,736
August	678,092	478,186
September	647,000*	437,181
October		516,814
November		495,488
December		514,337
12 mos.		5,549,323

* Preliminary.

Estimate for week ended:

	1949	(Same week) 1948
Oct. 8	148,443	119,398
Oct. 15	146,566	123,185
Oct. 22	145,132	123,067
Oct. 29	140,000	116,968

Estimates by Ward's Automotive Reports

English Auto Prices Cut

PRICE reductions of from $379 to $543 on English-built Ford cars and trucks have followed in the wake of devaluation of the pound. Retail delivered price at ports of entry on Anglia two-door sedan now is $947, on the Prefect four-door sedan $1039, on the ¼-ton Thames truck $813, and the ½-ton truck $1047. Approximately 12,000 British-built units have been shipped to the United States since May, 1948.

Dodge Roadster in Atomic Yellow

DODGE is now building its sports roadster in a new color, called atomic yellow no less. Also available are speed crank window lifts and new side windows of safety glass with chrome-trimmed frames and ventilator wing frames. The windows are raised or lowered with only 1½ turns of the crank, and they come as extra equipment, standard windows being of clear plastic and not adjustable.

Willys Export High

WILLYS-OVERLAND Export Corp. has shipped the 100,000th vehicle to be sold overseas since postwar operations began. Dollar value of these export shipments tops $100 million and in addition there have been sales of $9 million worth of parts and accessories, as well as $1 million worth of farm implements and special equipment.

Agricultural implements manufactured by Monroe Auto Equipment, Monroe, Mich., are being exported by Willys and plans are being drawn for assembly and manufacturing plants in India, France, Yugoslavia, Belgium, Sweden, Holland, Denmark and Australia to produce a hydraulic lift designed by the Monroe company as a Jeep accessory.

Not Worried by Strikes

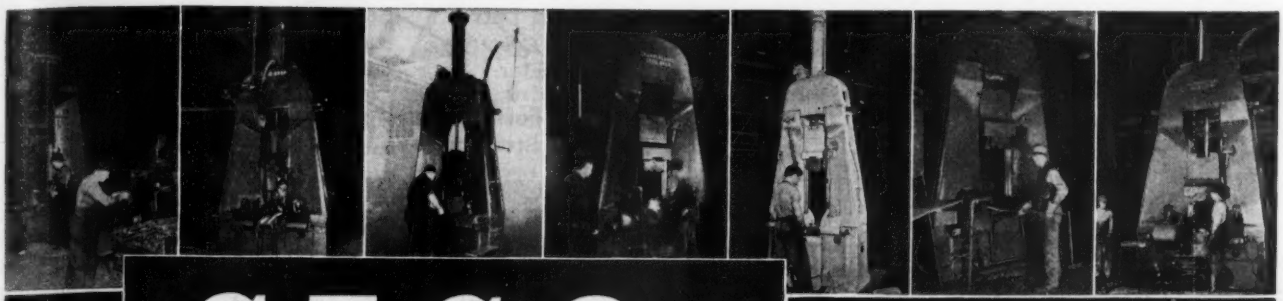
THE steel and coal strikes are not causing West Coast car dealers to worry about supplies of automobiles. Dealers' supplies of most models are comparatively large, and inventories of some makes are becoming burdensome.

A majority of dealers are more than eager to sell new cars and are elevating trade-in allowances well above blue book value of the used cars offered for trade. Other dealers are throwing in extras, or making cash discounts.

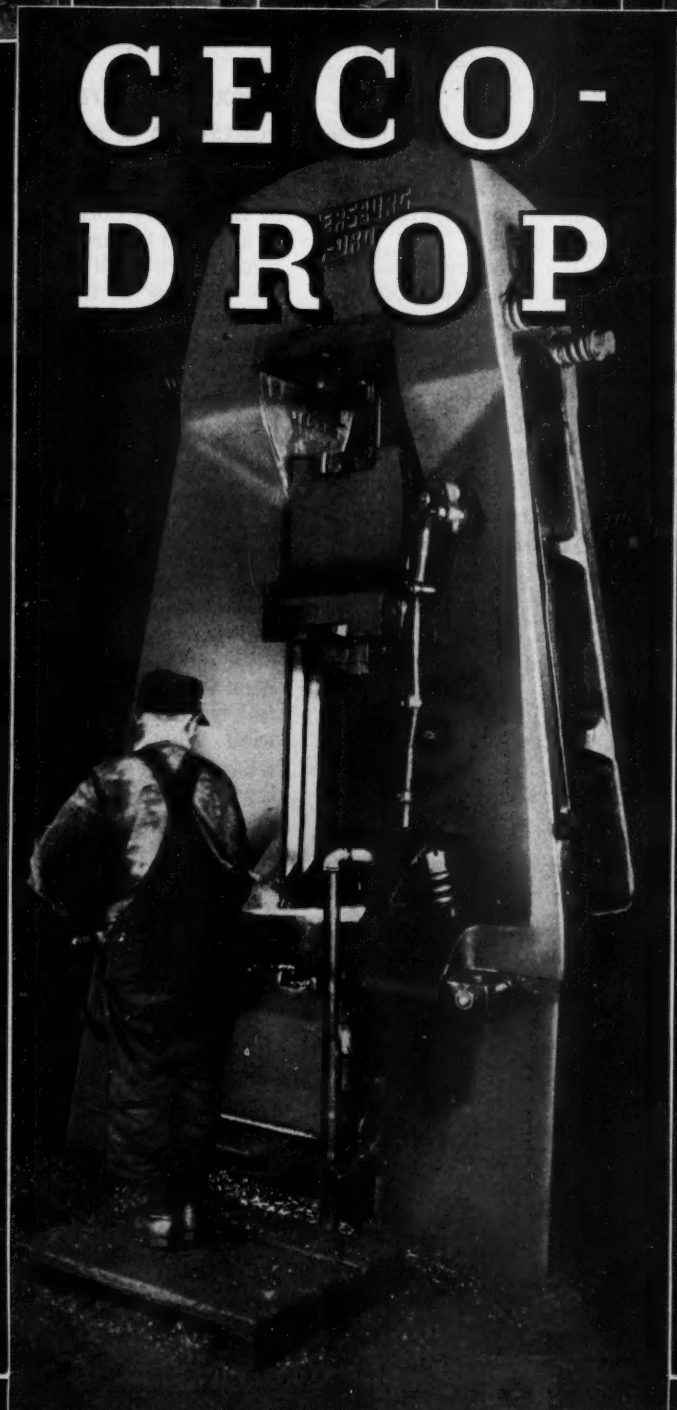
Several Seattle dealers are reported shaving interest rates on time payments, offering cars on a basis of no money down, and extending time limits for payments. In other major West Coast cities, San Francisco and Los Angeles in particular, there's no trend toward reduction in interest rates, and time payments generally are on a basis of one-third down with about 30 months to pay the rest.

Unhampered by Strike

STUDEBAKER Corp. of Canada Ltd. will be able to continue full production at its Hamilton, Ont., plant until sometime in mid-November, D. C. Gaskin, vice president and general manager, reports. If the steel strike in the United States is not settled by that time, the plant will be forced to shut down.



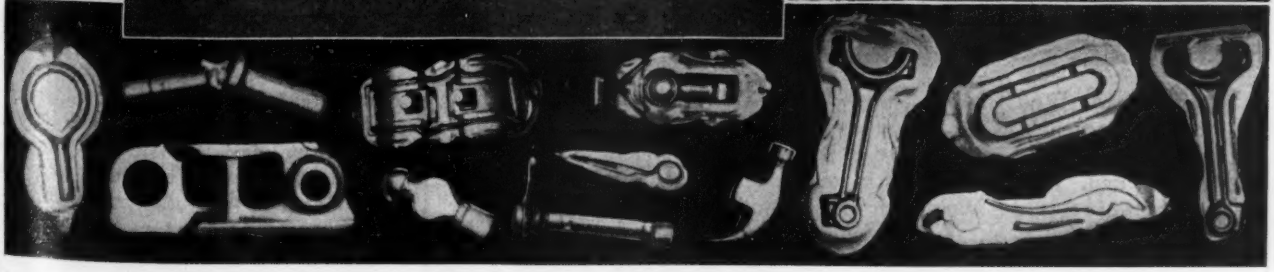
CECO-DROP



The Chambersburg CECO-DROP is a new piston-lift, gravity-drop hammer in which the ram is lifted by air or steam rather than by friction operated boards. There are fewer operating parts, shock-absorbing mechanisms are employed, lubrication is automatic and operation is simple and safe. In shop after shop, over the past few years, the CECO-DROP has amply proved that it can forge more minutes per hour, make more forgings with fewer blows, costs less to operate and is safer and easier on the hammerman.

Write for Bulletin II-L-9

CHAMBERSBURG ENGINEERING CO.
CHAMBERSBURG, PENNA.



Jet Testing Laboratory

Completed by United Aircraft. Windowless structure is six stories high

UNITED AIRCRAFT Corp. saved a lot of money for its new experimental jet engine testing laboratory when wide-awake officials got hold of power generating equipment from Navy cruisers and war-surplus, lend-lease vessels.

Four boilers were on their way to a Philadelphia junk yard after the war when Pratt & Whitney Division of United found them. They were bought for a fraction of the cost of building new boilers. Six destroyer escort vessels yielded similar discounts on 12 turbogenerator sets for the laboratory.

The massive steel and concrete structure in East Hartford, Conn., is complete except for installation of a few major pieces of equipment. A windowless building, six stories high and 400 ft long, the laboratory will be named in honor of Andrew Willgoos, chief engineer of Pratt & Whitney for 23 years.

The central service equipment section of the laboratory has enough marine power to move a formidable fleet; the four generators turn out 18,400 kw—enough to supply a city of 70,000 with light and power.

Burns & Roe Inc., New York, was engineering consultant on the laboratory project; Albert Kahn Associated Architects & Engineers Inc., Detroit, the architect; and Turner Construction, New York, the contractor.

Idle Aircraft Plant Needs Facility

A huge aircraft plant at Stratford, Conn., left idle when the operators moved to Texas, will be sold jointly by United Aircraft Corp. and General Services Administration. The idea is to get it back into some phase of manufacture to make employment.

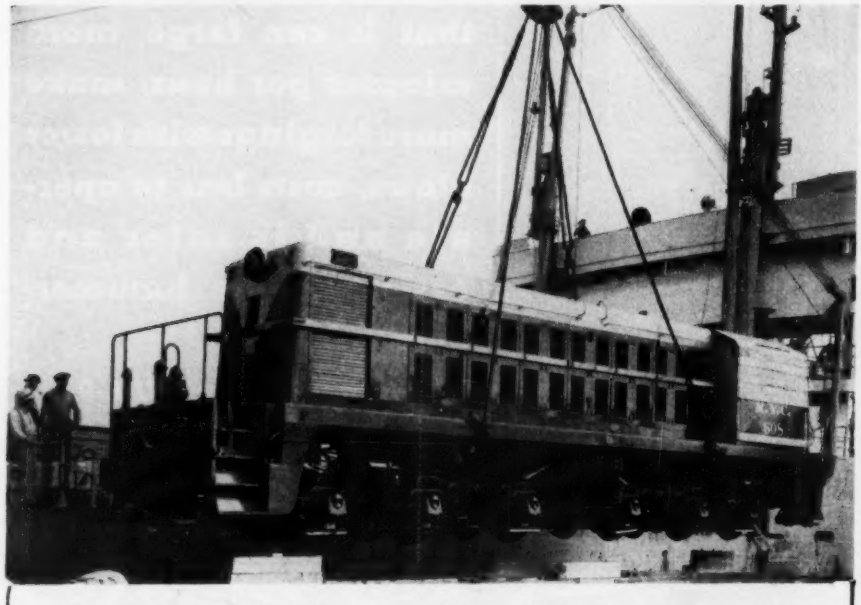
The plant's 43 buildings and 53 acres will be sold as a single unit. Bids will be received in the Office of Surplus Property, General Services Administration, 18th and F streets, Washington, up to Nov. 21 when they will be opened publicly.

Known as the Industrial Plant of the Chance Vought Aircraft Division of United Aircraft Corp., it was expanded by the Navy during the war to produce Corsair shipboard fighters. When the operator moved to Dallas in June, the Navy declared its interest in the property excess. Altogether the plant covers 1,450,000 sq ft.

Marion to Stay in Cambridge

MARION Power Shovel Co., Marion, O., is assured as a permanent industrial operation in Cambridge, O. The company exercised its option and purchased the sheet mill property once owned by Carnegie-Illinois Steel Corp.

Carnegie-Illinois abandoned the property in the depression when it centered its operations in Pittsburgh. The Community Industrial Association, Cambridge, a nonprofit organization took over the property, which during the war was used by the government as a U. S. Engineers Corps subdepot. After the war the Community Industrial Association again secured the property. Marion Power Shovel leased the property with option to buy. It employs 100 persons at the Cambridge plant where walking draglines are manufactured.



PART OF A TRAINLOAD: Shipped from Whitcomb Locomotive Co.'s plant in Rochelle, Ill., this 66-ton diesel-electric locomotive is being loaded aboard the *S. S. Gadsden* in Baltimore for shipment to Fortaleza, Ceara, Brazil. It is only part of a solid trainload of parts and locomotives consigned to the Ministry of Transportation & Public Works in Rio de Janeiro

Essex Wire Wraps Up Cords

PURCHASE of all machinery, tools, inventory, buildings and real estate of Cords Ltd., Newark, N. J., was made by Essex Wire Corp., Ft. Wayne, Ind., at a federal bankruptcy sale.

Essex Wire will continue to operate the business as Cords Ltd. Division of Essex Wire Corp. Many of the same personnel will remain under the ownership. Production and delivery will start about Nov. 1.

Colby Steel & Mfg. Started

ORGANIZATION of Colby Steel & Mfg. Co. is announced by Mark R. Colby, president of Colby Steel & Engineering Co., Seattle. Incorporators of the new firm are officials of the parent corporation. They are: M. S. Alexander, vice president; A. L. Senn Sr., supervising engineer; Charles D. Gould, chief engineer; and Fred Wubbena, assistant treasurer who will be treasurer of the new organization.

Colby Steel & Engineering Co., founded over 40 year ago, specializes in cranes, marine elevators and material handling equipment.

Pacific Car Expands

PACIFIC Car & Foundry Co. announces a $300,000 expansion program to diversify fabricating facilities at its structural steel division. Paul Jacobsen is manager.

Additional space will be afforded by a steel building 85 x 420 ft. It will involve 200 tons of structurals. Equipment will include automatic welding devices, gantry crane, power riveting machine and plate shearing and forming machinery.

Sargent Completes Building

E. H. SARGENT & Co. completed its new Chicago offices and plant building in a new area of modern factories on the city's northwest side.

The one-story, steel, concrete and brick building was designed to expand the services of the 97-year-old company, a manufacturer and distributor of laboratory instruments, apparatus and chemicals.

Briefs . . . .

Paragraphs on developments of interest and significance within the metalworking industry

Tinnerman Products Inc., Cleveland, established a western New York sales division with headquarters in Rochester, N. Y. Tinnerman is the manufacturer of Speed Nuts, Speed Clips and Speed Clamps.

—o—

Belfield Valve Division of Minneapolis-Honeywell Regulator Co. is adding to its field sales staff in a new and expanded sales and manufacturing program that will cover the country. Efforts will be directed to all types of manufacturing and processing industries.

—o—

Gray Iron Founders' Society has released its 1949 "Directory of Members." The 80-page book, largest in the history of the organization, contains an alphabetical list of 540 gray iron foundries in the U. S. and Hawaii. Each firm's listing includes name, address, telephone number, executive personnel, trademark, general type of castings produced, size and weight range of castings, operating capacity and type of foundry operation. Society is located at 210 National City Bldg., Cleveland.

—o—

Pressed Steel Car Co. is moving its general offices from Pittsburgh to Chicago. Company has plants in McKees Rocks, Pa., Chicago and Mt. Vernon, Ill. The McKees Rocks and Mt. Vernon plants have been shut down for lack of orders and will remain closed until railroads come back into the market for cars.

—o—

National Pneumatic Co. closed its Rahway, N. J., plant and moved to its Boston plant. Reason: Contraction of the firm's business. It manufactures door control equipment for trains, subways, trolley cars and busses.

—o—

Fairchild Engine & Airplane Corp., Farmingdale, N. Y., will purchase land and buildings now occupied by four divisions of the company from General Services Administration for $1,125,000.

—o—

Wigton-Abbott Corp., Plainfield, N. J., has just completed three more new buildings for the Texas Co. at its Eagle Point plant near Camden, N. J.

—o—

Kaiser Industries Inc. is the new name of Kaiser Engineers Inc., Oakland, Calif. The engineering and construction division will continue to do business as Kaiser Engineers Division of Kaiser Industries Inc.

—o—

Fleet of America Inc. has started production of aluminum products in a plant in Blasdell, N. Y. The new company is headed by Tom Y. Smith, former general manager of Fleet Mfg. Co., Ft. Erie, Ont.

—o—

Vacuum Cleaner Manufacturers' Association reports factory sales of standard size household vacuum cleaners in September were third highest of any month in 1949. The total: 247,036 units, an increase of 12.3 per cent over 219,909 in August, and down 10.5 per cent from the September, 1948 figure.

—o—

Fischer & Porter Co., Hatboro, Pa., will hold its next instrumentation course at its Hatboro plant Jan. 23 through 27, 1950. Course will cover manufacture, calibration, installation, operation and maintenance of process control instruments.

—o—

New England Metallurgical Corp., Boston, acquired Springfield Heat Treating Corp., Springfield, Mass., which will be operated as a Springfield Division. A. Dudley Bach is president of the New England company, which also operates a Worcester Division.

—o—

Whiting Corp. consolidated its Whiting Freezer Division sales offices in Chicago with the company's general administration offices at Harvey, Ill.

—o—

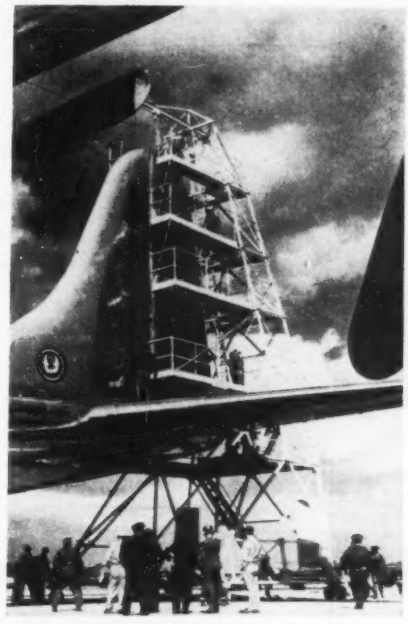
Erie Railroad's annual report has been judged as best among central-eastern railroads for the second consecutive year in a survey conducted by *Financial World*. Presentation of a bronze "Oscar of Industry" will be made to Erie in New York, Oct. 31.

—o—

Youngstown Sheet & Tube Co.'s cold strip department at the company's Campbell, O., plant received a bronze plaque for operating over a million man-hours without a disabling injury. In this period the department produced 425,134 tons of steel, enough to make about 500,000 automobiles.

—o—

International Standard Electric Corp., subsidiary of International Telephone & Telegraph Corp., has a contract with the Republic of Lebanon to install a modern navigation and instrument landing system for the republic's new International Airport.



THE RIG IS UP: Five-deck, 60-foot empennage stand towers against tail of a B-36. Rig was made by Simpson Jumbo Steel Products Co., Azusa, Calif. NEA photo

—o—

Hydraulic Press Mfg. Co., Mt. Gilead, O., was given a contract for an 18,000-ton hydraulic press for forming heavy pipe for high pressure pipe line. H-P-M's customer is National Tube Co., Pittsburgh. Pipe up to 36 in. in diameter, 40 ft long with ½ in. wall thickness will be formed with the giant press. Here's how big the press is: Its die mounting surfaces are 4½ x 41 ft.

—o—

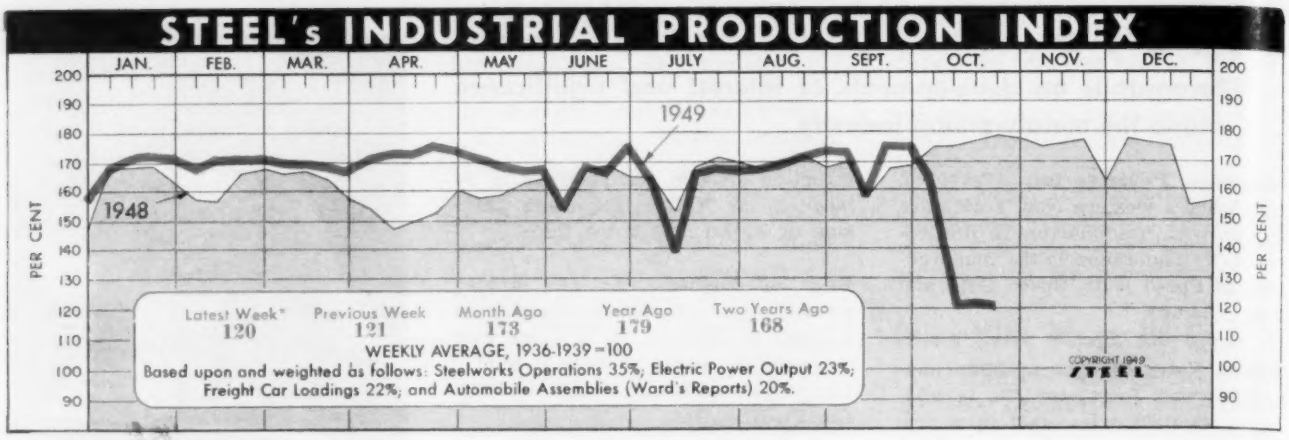
Russell Mfg. Co., Middletown, Conn., manufacturer of transmission belting, brake and clutch facing and asbestos specialties, will establish a branch manufacturing plant at Lexington, S. C., for production of nylon and cotton narrow elastic fabrics.

—o—

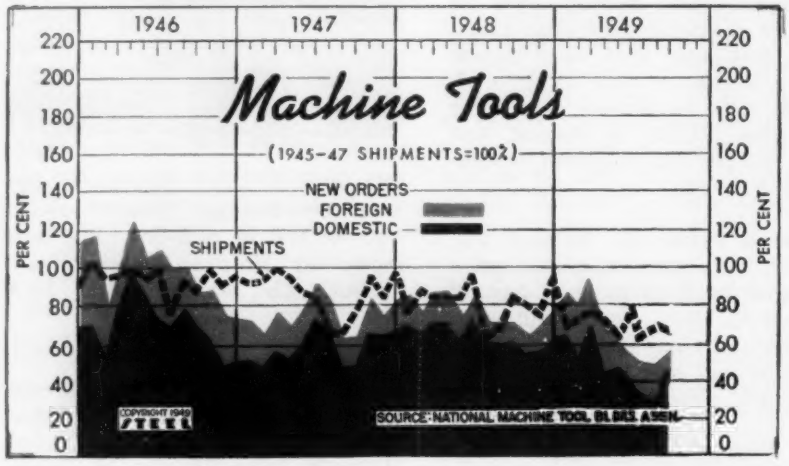
Whiton Machine Co., New London, Conn., appointed Valley Supply & Tool Co., Aurora, Ill., and Bansbach Machinery Co., Chicago, to handle Whiton's line of lathe chucks, centering machines, special purpose high production milling machines and gear cutters in the Chicago area.

—o—

Meehan Steel Products Co., Ironton, O., is building a new steel warehouse, 80 x 262 ft. It will provide storage space for products used in manufacturing finished steel products. Meehan also fabricates structural steel and ornamental iron.


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
PER CENT
1948
1949
Latest Week* 120
Previous Week 121
Month Ago 173
Year Ago 179
Two Years Ago 168
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
COPYRIGHT 1949 STEEL

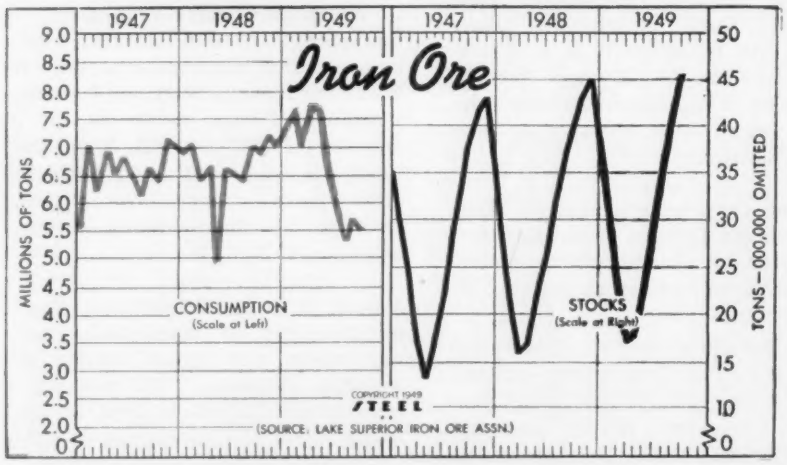
* Week ended Oct. 22 (preliminary).



Machine Tools

(1945-1947 Shipments = 100)

	Orders				Shipments	
	Total		Domestic			
	1949	1948	1949	1948	1949	1948
Jan.	87.0	83.1	65.1	69.1	68.8	75.3
Feb.	80.9	77.3	54.4	64.6	70.3	87.1
Mar.	93.5	86.3	71.2	70.2	75.8	83.6
Apr.	70.1	86.3	47.0	72.2	74.7	82.0
May	63.7	73.5	47.9	62.1	72.8	82.6
June	53.6	83.4	38.0	71.5	79.0	94.4
July	48.0	74.0	34.0	61.1	60.7	62.4
Aug.	51.5	73.7	32.7	60.9	67.3	69.8
Sept.	57.7	73.1	44.0	61.5	67.6	84.7
Oct.	...	67.4	...	53.4	...	80.4
Nov.	...	72.2	...	54.1	...	76.2
Dec.	...	76.7	...	60.5	...	96.9

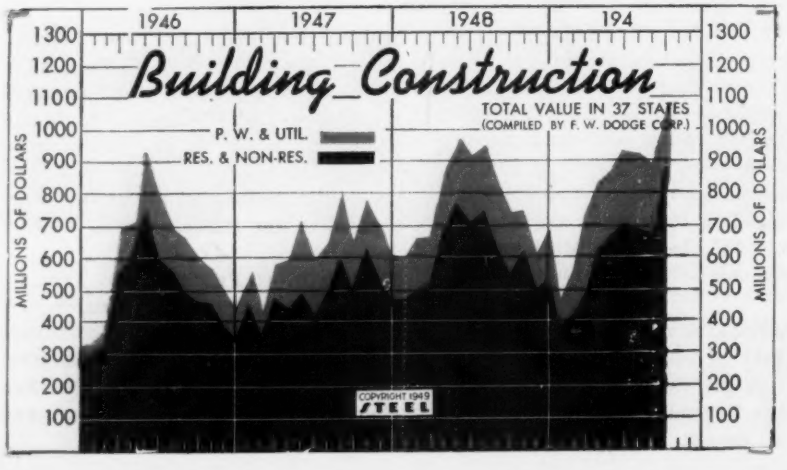


Iron Ore

(Lake Superior Iron Ore Assn.)

Gross tons—000 omitted

	Consumption		Stocks at Lake Erie Docks and Furnaces	
	1949	1948	1949	1948
Jan.	7,590	7,057	31,904	29,081
Feb.	6,992	6,440	24,981	22,628
Mar.	7,735	6,634	17,308	16,022
Apr.	7,322	4,976	17,803	17,125
May	7,277	6,656	21,508	22,058
June	6,249	6,577	27,696	26,965
July	5,258	6,479	35,064	32,611
Aug.	5,711	7,036	40,811	37,081
Sept.	5,541	6,965	45,356	40,923
Oct.	....	7,273	.....	43,883
Nov.	....	7,058	.....	45,160
Dec.	....	7,351	.....	39,460
Total	....	80,504		



Construction Valuation in 37 States

(Unit—$1,000,000)

	Total	Public Works, Utilities		Residential and Non-residential	
	1949	1949	1948	1949	1948
Jan.	483.0	102.0	136.6	381.0	478.6
Feb.	568.5	153.5	177.3	415.0	504.6
Mar.	747.6	168.4	164.3	579.2	525.5
Apr.	842.6	222.4	184.7	620.2	689.2
May	880.3	213.5	205.0	666.9	765.8
June	945.7	239.0	215.7	706.7	719.5
July	943.6	252.7	217.9	690.9	744.8
Aug.	905.7	234.3	207.8	671.5	646.3
Sept.	1,093.7	223.1	202.7	870.6	559.5
Oct.	....	....	165.5	....	613.1
Nov.	....	....	106.9	....	504.3
Dec.	....	....	170.9	....	525.1
Total	....	....	2,155.3	....	7,274.4

The Business Trend

ALTHOUGH the physical position of STEEL's industrial production index for the week ended Oct. 22 changed only slightly, down 1 point to 120 per cent (preliminary) from 121 a week earlier, additional chinks were visible in the metalworking industry's armor. The pinch was beginning to hurt and additional companies began to get ready for cutbacks and shutdowns. Steel stocks are dwindling rapidly and even an early settlement of the strike will not eliminate shutdowns to balance inventories. Coal supplies are relatively better but are a source of growing concern.

In the corresponding week last year the index reached the high point for 1948. A glance at the accompanying chart shows a difference of 59 points between the latest week and the same week in 1948.

AUTOMOBILES—The nation's healthiest industry joins the list of those with aches and pains. Outturn remained high in the week ended Oct. 22 with 145,132 passenger cars and trucks rolling off assembly lines. It was, however, the fifth consecutive week in which production was lower than in the preceding week. November output is certain to be affected no matter what happens to steel. Cutbacks are expected in order to spread employment but in some cases shutdowns are perilously close at hand. Introduction of new models scheduled for November by several builders is now clouded by uncertainty.

COAL—Bituminous coal output in the week ended Oct. 15 was about 2.4 million tons, compared with 2.2 million tons in the preceding week and 12.5 million tons in the same week last year. Mines employing United Mine Workers were shut down with the exception of those west of the Mississippi. Shrinking coal stocks have forced some railroads to curtail operations of steam drawn passenger trains.

RAILROADS—Association of American Railroads estimates railroad operating revenues in September decreased 16.6 per cent as compared with the same month a year ago. Freight revenue was down 17 per cent and passenger revenue dropped 15.8 per cent. Decreases were recorded in each of the three districts in which the nation's railroads are divided.

CONSTRUCTION—Civil engineering construction volume totaled $121.5 million in the week ended Oct. 20, down 6 per cent below the corresponding week last year. Heavy construction for the year to date totals $6.6 billion, 17 per cent above the corresponding total a year ago. Private construction is $3.1 billion and public construction $3.5 billion, 15 per cent and 19 per cent, respectively, above year ago totals.

PRICES—Bureau of Labor Statistics wholesale price index remained unchanged in the week ended Oct. 18 at 152.1 per cent of the 1926 average, 8.3 per cent below the comparable week in 1948. The metals and metal products index also was unchanged at 169.2. The bureau's comprehensive monthly wholesale price index rose 0.5 per cent in September to 153.7 per cent of the 1926 average but was 9 per cent below the year ago level.

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	9.5	8.0	86.0	98.5
	Electric Power Distributed (million kilowatt hours)	5,418	5,481	5,556	5,539
	Bituminous Coal Production (daily av.—1000 tons)	398	385	1,400	2,077
	Petroleum Production (daily av.—1000 bbl)	5,072	5,044	4,933	5,644
	Construction Volume (ENR—Unit $1,000,000)	$121.5	$143.7	$188.7	$129.0
	Automobile and Truck Output (Ward's—number units)	145,132	146,566	158,007	123,067
	* Dates on request. † 1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.				
TRADE	Freight Carloadings (unit—1000 cars)	575†	584	661	928
	Business Failures (Dun & Bradstreet, number)	181	172	169	124
	Money in Circulation (in millions of dollars)‡	$27,427	$27,546	$27,365	$28,157
	Department Store Sales (changes from like wk. a yr. ago)‡	−12%	−11%	− 7%	+11%
	† Preliminary. ‡ Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$15,216	$10,477	$15,160	$15,842
	Federal Gross Debt (billions)	$256.6	$256.5	$256.4	$252.3
	Bond Volume, NYSE (millions)	$15.9	$14.1	$14.2	$19.8
	Stocks Sales, NYSE (thousands of shares)	6,628	6,225	6,366	6,933
	Loans and Investments (billions)†	$66.2	$66.1	$66.3	$62.1
	United States Gov't. Obligations Held (millions)†	$37,300	$37,252	$37,594	$33,022
	† Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	152.52	152.52	152.52	151.86
	STEEL's Nonferrous Metal Composite‡	169.1	170.6	180.3	221.7
	All Commodities†	152.1	152.1	154.0	165.8
	Metals and Metal Products†	169.2	169.2	170.5	172.6
	† Bureau of Labor Statistics Index, 1926=100. ‡ 1936-1939=100. ††1935-1939=100.				

Men of Industry

B. A. BANNAN

OWEN W. GAUDERN

THOMAS K. CONNELLAN

B. A. Bannan has been appointed general manager, **Western Gear Works** and all affiliated plants and companies. He will continue as vice president with headquarters at the Lynwood, Calif., plant and will control and supervise the Pacific western group comprising Western Gear Works plants in Seattle and Lynwood, Pacific Gear & Tool Works, San Francisco, and South Western Gear Works, Houston. **B. J. Bannan,** Seattle, has been appointed assistant to the new manager, and will also have headquarters in Lynwood. His major responsibility will be co-ordination of manufacturing operations.

—o—

Robert Montgomery has been appointed general parts manager, **Willys-Overland Motors Inc.,** Toledo, O. **August Benhoff,** who has been with the company for the last 45 years, and has been head of its parts department for the last 36 years, will remain in active duty with the company to assist Mr. Montgomery in an advisory capacity. Since June of this year, Mr. Montgomery has been assistant to **Delmar G. Roos,** first vice president and operating head of Willys-Overland, and prior to June was comptroller of the company for two years. He is succeeded as assistant to Mr. Roos by **C. Coyle Smith,** manager of the projects planning and research department, who joined Willys' administrative planning staff in 1946.

—o—

Joseph N. Moorhead, who retired in July as works manager, Buffalo plant, American Magnesium Corp., has joined **Electro Refractories & Alloys Corp.,** Buffalo, in a consulting capacity.

Owen W. Gaudern has been promoted to manager of purchases, **Fluor Corp. Ltd.,** Los Angeles. He entered the purchasing field with Neilan Co. of Los Angeles. In 1934 he joined Fluor and a year later was transferred to the purchasing department. He has been serving as assistant manager of purchases.

—o—

John P. Critchlow has been appointed chief fuels and lubricants engineer, rolling mill section, for **Gulf Oil Corp.,** subsidiary, Gulf Refining Co., Pittsburgh. He joined Gulf in 1947 as lubrication engineer, and previously was with Mesta Machine Co. as rolling mill design engineer.

—o—

Howard Kyser, formerly plant production superintendent, Vernon, Calif., plant of **Studebaker Pacific Corp.,** has been appointed general superintendent. He was first employed by Studebaker in 1926 as a laboratory engineer at its main plant in South Bend, Ind.

—o—

Kenneth A. Field has been appointed service manager, Wellsville, N. Y., Works, **Worthington Pump & Machinery Corp.** He was previously employed by Allis-Chalmers Mfg. Co.

—o—

J. W. Coffman has been elected president and treasurer of the newly organized **Tecnifax Corp.,** Holyoke, Mass., manufacturer of diazotype materials and supplies for use on Ozalid and similar whiteprinting machines. Mr. Coffman formerly was vice president of General Analine & Film Corp. in charge of its Ozalid Division. **S. C. Slifkin,** formerly research director of Ozalid, is vice president and director of research of the new firm.

Thomas K. Connellan has been appointed manager, Strand Garage Door Division, **Detroit Steel Products Co.,** Detroit. He has been with Strand garage door since its inception in October, 1945. He was assistant to **Carl A. Strand,** president, Strand Building Products Co., for several years up to December, 1947, when that firm was bought by Detroit Steel Products Co. Since then Mr. Connellan has been in charge of sales and promotional work for the Strand Garage Door Division.

—o—

Alex Zuk has joined **Laclede-Christy Co.,** St. Louis, as engineer in its Arch & Wall Sales Division, with headquarters in New York. He has been with Westinghouse Electric Corp. for 10 years, and for two years was with Iorio Construction Co., Newark, N. J.

—o—

Earl T. Gruendike, formerly general superintendent, **General Railway Signal Co.,** Rochester, N. Y., has been appointed works manager, and **Charles J. Gendreau,** formerly assistant factory superintendent, becomes general superintendent. Mr. Gruendike joined the company in 1922.

—o—

Raymond Z. Oswald has been elected vice president, **Cleveland Graphite Bronze Co.,** Cleveland, in charge of replacement sales. He was president of Monmouth Products Co. when it was purchased last month by Cleveland Graphite Bronze. Mr. Oswald has been in the automobile parts sales field for 24 years. From 1925 to 1945 he was with Thompson Products Inc., Cleveland, becoming business manager of its service division. In 1945 he became director of operations at Harry Ferguson Inc., in De-

TINNERMAN

Speed Nut

SAVINGS STORIES

Studebaker

USES "J" TYPE SPEED NUTS

Saves 35% on Fender Assembly Cost

Right out of Studebaker's own cost estimate files comes this report of outstanding SPEED NUT savings.

To establish this saving factor, tests were made using 18 welding nuts to fasten the rear fenders to the body. Then, for comparison, 18 "J" Type SPEED NUTS were used to perform the same operation. The resulting statistics reveal that SPEED NUTS *provide a 35% savings in material and assembly costs on this application.*

This is one reason why there are hundreds of SPEED NUT brand fasteners of various types used in the assembly of the 1950 Studebaker.

Here, too, is sufficient reason why you should investigate the SPEED NUT way to lower assembly costs and improved product quality. Ask your Tinnerman "Fastening Specialist" for information on the comprehensive Fastening Analysis Service . . . and write for your free copy of SPEED NUT Savings Stories. TINNERMAN PRODUCTS, INC., 2040 Fulton Road, Cleveland 13, Ohio. In Canada: Dominion Fasteners, Ltd., Hamilton.

"The Next Look in Cars"—
The 1950 Studebaker Land Cruiser
Thumb pressure snaps "J" Type SPEED NUT over edge of wheel house panel, in position for blind location assembly. Provides secure, vibration-proof attachment on Acme bolt.
TINNERMAN
Speed Nuts

troit, and resigned the following year to join Monmouth.

—o—

Gustie Stevenson has been appointed

GUSTIE STEVENSON

chief engineer, **Arthur Colton Co.,** Detroit,builder of pharmaceutical and packaging machinery, and division of Snyder Tool & Engineering Co. He joined F. J. Stokes Machine Co., Philadelphia, in 1925 as chief draftsman, and became chief engineer of that company, serving from 1942 until 1949. **Al Kath,** veteran of the Colton organization, with 40 years of experience in the building and development of pharmaceutical and packaging machinery, has been appointed chief engineer, and **Kenneth E. Rogers,** who joined Snyder Tool & Engineering Co. in 1947, transfers to the Colton division as assistant director of sales.

—o—

Spencer K. Butterworth has joined the metal department of **Bache & Co.,** New York. He has been actively engaged in the metal business for the last 30 years, and prior to World War II was the sole proprietor of S. K. Butterworth Co., specializing in nonferrous metals. During the war he was deputy director, Tin, Lead & Zinc Division, War Production Board, and subsequently, held the same position in the Civilian Production Administration.

—o—

Bay State Abrasive Products Co., Westboro, Mass., announces appointment of **Elden L. Auker** as assistant district manager in the Michigan area. Since January, 1948, he has been employed by Bay State as an abrasive engineer and prior to that time was Detroit district manager for Mid-West Abrasive Co.

—o—

Henry L. Charlton has been elected president of **Highway Trailer Co.,** Edgerton, Wis., to succeed **E. A. Menhall.** Mr. Charlton was a vice president and director of Reynolds Metals Co. and was associated with Reynolds' interests for 25 years before retiring recently. Highway Trailer, which makes commercial trailers and equipment for power companies and telephone and oil industries, is controlled by Liberty Products Corp. and Atlas Corp.

—o—

Henry B. Thackston, manager, Atlanta district, replacement tire sales division, **B. F. Goodrich Co.,** Akron, has been appointed sales development manager of the southeastern division, with headquarters in Atlanta. He is succeeded by **Donald E. Lagarde.**

—o—

S. A. Press has been appointed general sales manager, **Swan-Finch Oil Corp.,** New York. He has been sales manager, John Lucas Paint Co., New York, for the last 11 years.

—o—

John W. Miller has been appointed

JOHN W. MILLER

superintendent of production planning at the Fontana, Calif., plant of **Kaiser Steel Corp.** He succeeds **Thomas Jones,** resigned. Mr. Miller went to Fontana in 1945 as assistant superintendent of production planning. He had previously been associated with Carnegie-Illinois Steel Corp., South Chicago, Ill.

—o—

Gordon R. Findlay has joined **National Research Corp.,** Cambridge, Mass., to engage in research in the field of applied physics.

—o—

National Lead Co., Baroid Sales Division, New York, announced promotion of four employees in its production department and mining and milling operations: **Reginald Rowand,** superintendent of Baroid's bentonite plants and properties, with headquarters at Belle Fourche, S. Dak., has been appointed manager, Baroid's Magnet Cove, Ark., barytes plant and properties. **Harold E. Billings,** since 1947 cost analyst, production department, has been made supervisor of product control, Baroid's production department. **B. C. Elsley,** staff engineer with Baroid, has been appointed assistant superintendent, bentonite plants and properties. **Byron H. McCain,** supervisor of excavation at Baroid, has been made superintendent, bentonite mines and mills.

—o—

Belfield Valve Division, **Minneapolis-Honeywell Regulator Co.,** Minneapolis, has added to its field sales staff in a new and expanded sales and manufacturing program. Those assigned on regional valve sales are: **Russell A. Schlegel,** eastern region, with headquarters in New York; **George Brown,** central region, with headquarters in Cleveland; **Robert Scott,** midwest and northwest regions, with headquarters in Chicago; and **William Clements,** Pacific-north coast and mountain regions, with headquarters in Los Angeles. These men were formerly members of the field sales staff of Honeywell's Brown Instruments Division.

—o—

C. M. Robertson has been appointed an associate of **Gute Co.,** manufacturers' representative of machine tools, with offices in the Wisconsin Tower Bldg., Milwaukee. Mr. Robertson is a mechanical engineer.

—o—

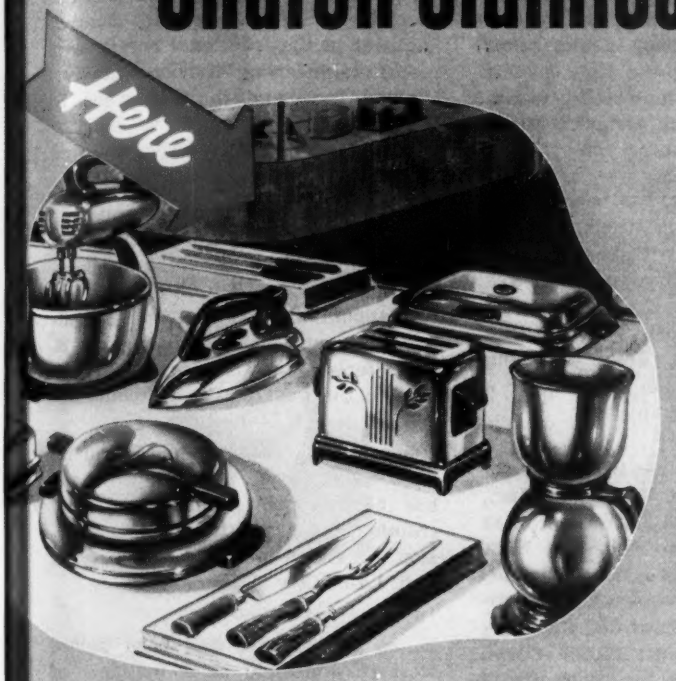
Roger S. Warner has resigned as director of engineering for the Atomic Energy Commission, and has joined the staff of **Arthur D. Little Inc.,** Cambridge, Mass.

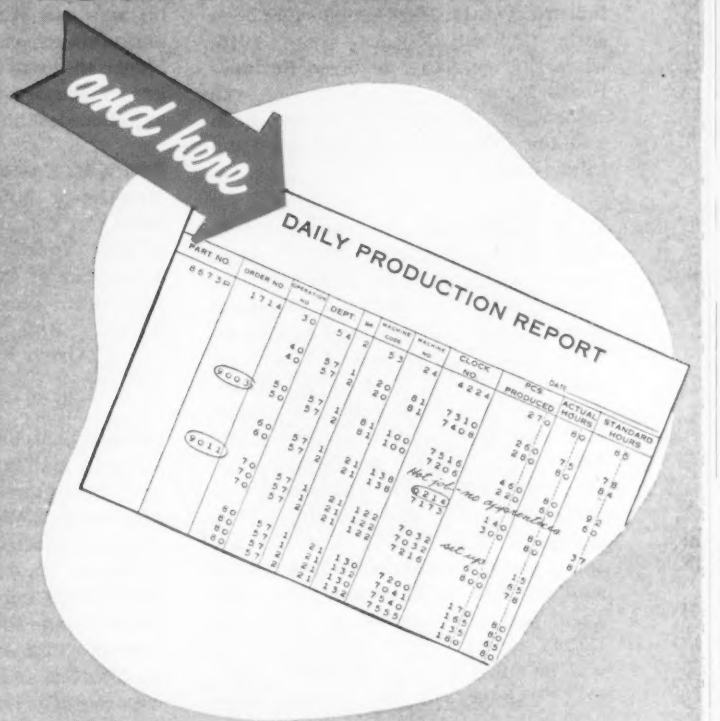
—o—

A. J. Campau has been appointed director of the purchasing and salvage section of **General Motors Corp.,** Detroit. He succeeds **D. F. Hulgrave,** recently named executive in

A. J. CAMPAU

Sharon Stainless Looks Better...



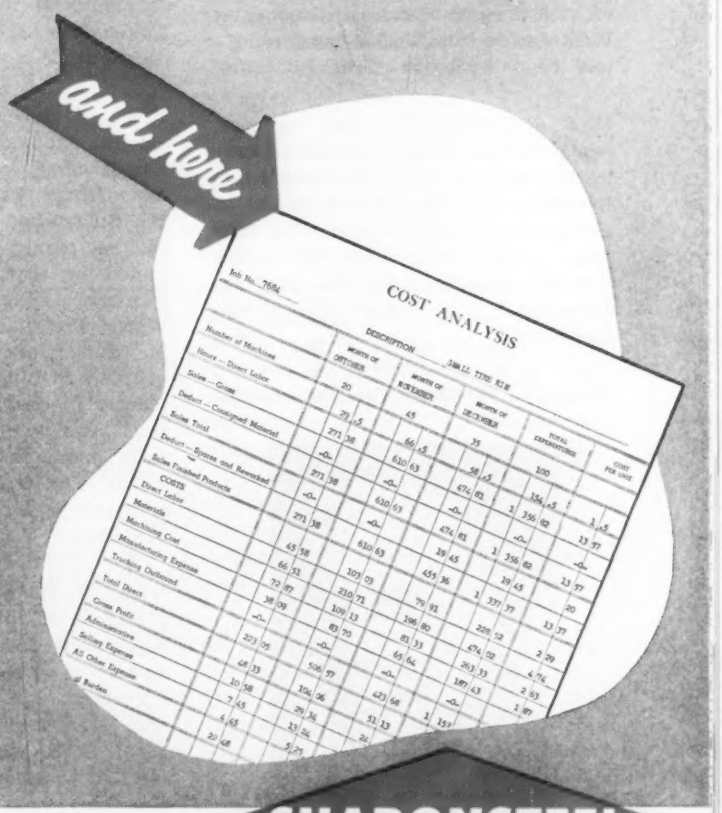


Better Products, Higher Production Lower Costs With Sharon Stainless

To those of you who are not already using Sharon Stainless Steel we offer a challenge. Give us your steel requirements and we will furnish you with Stainless that will fit the job to perfection. And the steel will come to you of uniform temper, gauge and size, eliminating unnecessary stoppage, adding extra hours to the life of your dies and reducing buffing and finishing time.

This means that you can get a better looking finished product faster — boosting production — cutting costs.

If you're thinking of Stainless — think of Sharon — pioneer and prime producer of quality Stainless for a quarter century. Engineering help, fabrication information available upon request.



SHARONSTEEL

SHARON STEEL CORPORATION *Sharon, Pennsylvania*

PRODUCTS OF SHARON STEEL CORPORATION AND SUBSIDIARIES: THE NILES ROLLING MILL COMPANY, NILES, OHIO; DETROIT TUBE AND STEEL DIVISION, DETROIT, MICHIGAN; BRAINARD STEEL COMPANY, WARREN, OHIO; SHARONSTEEL PRODUCTS COMPANY, DETROIT, MICHIGAN, AND FARRELL, PENNA.; CARPENTERTOWN COAL AND COKE CO., MT. PLEASANT, PENNA.; FAIRMONT COKE WORKS, FAIRMONT, W. VA.; MORGANTOWN COKE WORKS, MORGANTOWN, W. VA.; JOANNE COAL COMPANY, RACHEL, W. VA. Hot and Cold Rolled Stainless Strip Steel—Alloy Strip Steel—High Carbon Strip Steel—Galvanite Special Coated Products—Cooperage Hoop—Special Steel Sheets—Hot Rolled Annealed and Deoxidized Sheets—Galvanized Sheets—Enameling Grade Steel—Welded Tubing—Galvanized and Fabricated Steel Strip—Steel Strapping, Tools and Accessories.

DIRECT SALES OFFICES: Chicago, Ill., Cincinnati, O., Cleveland, O., Dayton, O., Detroit, Mich., Indianapolis, Ind., Milwaukee, Wis., New York, N. Y., Philadelphia, Penna., Rochester, N. Y., Los Angeles, Calif., San Francisco, Calif., St. Louis, Mo., Montreal, Que., Toronto, Ont.

charge of the procurement and schedules activities of the GM manufacturing staff. Mr. Campau has been with General Motors since 1916, when the company acquired Scripps-Booth Motor Co., with which he was associated. Since 1939 he has been assistant director, purchasing and salvage section.

—o—

T. A. White has been appointed to head a new Pacific Coast sales region based in San Francisco for **Pontiac Motor Division,** General Motors Corp. He has been San Francisco zone manager for the division, and is succeeded by **Don R. Stuart,** who has been Omaha zone manager. **J. C. Jamieson** heads the new western sales region based in Kansas City, Mo., for Pontiac. He has been connected with the division since 1934, served in the Denver and Chicago zones before transfer to the Dallas zone in 1940 as assistant zone manager, and was named to head the Dallas zone in 1945. The latter post will be filled by **I. J. Woodfin,** assistant manager of the Atlanta zone.

—o—

Robert E. Harrington has been elected vice president and sales manager, **Western Machine Co.,** Milwaukee. He has been with the firm 23 years.

—o—

E. J. de Ridder, European engineer, has joined the staff of technical service engineers of **Reynolds Metals Co.,** Louisville, and has been assigned to aluminum design work. He has done design work with various aircraft companies and was chief engineer with I. G. Farben, Lightmetal Division.

—o—

Harry L. Spencer has been named

HARRY L. SPENCER

vice president in charge of manufacturing and engineering for the five plants of Norge Division, **Borg-Warner Corp.,** Detroit. He rejoined Norge in 1948 after five years with Bendix Home Appliances Inc., where he was vice president in charge of manufacturing. At the time he left Norge in 1943, he was factory manager of the Muskegon Heights, Mich., appliance plant.

—o—

James H. Cassell Jr. has been named director of public relations, **Pressed Steel Car Co. Inc.,** with headquarters in New York. Until recently he was a member of the staff of *Wall Street Journal* in New York and in Pittsburgh. **Maj. Gen. John Hilldring** (U. S. Army, ret.) has been elected a director of the company.

—o—

Richard G. Johnson has been appointed sales manager of **Van Auken Inc.,** with headquarters in Detroit. He has been with Cello Products Co., East Boston, Mass., where he was sales manager, and was previously associated with Snow Sales Co., Spokane, Wash., and Plymouth Motor Corp., Detroit. Van Auken Inc., with plants at Detroit and Mt. Clemens, Mich., was recently purchased by Penn-Ohio Steel Corp., Birdsboro, Pa., and is being operated as a subsidiary of that company. It manufactures the Van Auken line of automobile grille and deck guards.

—o—

Henry T. Sulcer has been appointed general manager of **Graver Water Conditioning Co.,** New York, subsidiary, Graver Tank & Mfg. Co. Inc. Mr. Sulcer had been general auditor of the parent company, which he joined in 1948. **Edward W. Welp,** formerly sales manager, Graver Water Treating Division, will assist Mr. Sulcer, and will make his headquarters in Chicago. **S. D. Barr,** previously in charge of eastern district sales, has been promoted to general sales manager, with offices in New York. The technical division of the company is now headed by **Vincent J. Calise.**

—o—

Oscar M. Havekotte has resigned as president of **International Derrick & Equipment Co.,** Dallas, and as a director of **Dresser Industries Inc.,** Cleveland. Mr. Havekotte was assistant treasurer of Carnegie-Illinois Steel Corp. when, in 1940, he was elected president, International-Stacey Corp., now International Derrick & Equipment Co.

—o—

F. E. Satterthwaite has been appointed quality control engineer, Plastics Division, chemical department, for General Electric Co. at Pittsfield, Mass. He has been quality control engineer for the product service division of the company in Bridgeport, Conn. He joined General Electric in 1946 as quality control engineer in the fractional horsepower motor engineering division at Ft. Wayne, Ind., and in 1948 went to Bridgeport to engage in similar work in the product service division.

—o—

Charles L. Waggoner has resigned as general superintendent, **Geneva Steel Co.** plant, Provo, Utah, subsidiary, U. S. Steel Corp. **James V. Mazurie** was appointed superintendent of rolling mills at Geneva, succeeding **R. D. Peterson,** who was named assistant to the general superintendent.

—o—

Howard B. Gunderson, president, Salt Lake Area Vocational School, has been appointed supervisor of training for the Utah Copper Division of **Kennecott Copper Corp.** at Salt Lake City, Utah.

—o—

E. A. Jacquemart has been named western divisional sales manager of **Kaiser-Frazer Corp.,** Willow Run, Mich.

—o—

Max L. Murdock, acting manager, centrifugal pump department, **Allis-Chalmers Mfg. Co.,** Norwood, O., Works, has been promoted to manager of the department. He succeeds **H. C. Gaton,** retired. **Woodrow Brixius,** formerly applications engineer in the company's West Allis Works centrifugal pump department, has been named assistant to Mr. Murdock, and **Paul B. Hugenberg** has been appointed application engineer in charge of sales and orders.

—o—

Howard W. King has been appointed

HOWARD W. KING

West Coast district manager, **Diamond Chain Co. Inc.,** Indianapolis. He will have headquarters in San Francisco. Mr. King has been associated for 21 years with Diamond

Chain, the last 14 years as district sales representative in Chicago.

—o—

Bernard E. Meyer has been named

BERNARD E. MEYER

to succeed **Frank Willmott** as Chicago district sales manager, **E. W. Bliss Co.** Mr. Meyer joined Bliss in 1925. A sales engineer covering the Chicago area since 1928, he has been on special assignment for the last four months in the general sales organization at the company's executive offices in Toledo, O. Mr. Willmott joined the Toledo Machine & Tool Division of Bliss in 1923 as sales engineer.

—o—

Robert B. Marsand has been elected executive vice president and general manager of two affiliate companies of Eastern Metals Corp.: **Structural Iron & Steel Corp.** and **Industrial Materials Export Corp.**, both of Newark. Mr. Marsand, who is president of the American-Brazilian Trade Council, has been in the steel business, both domestic and export, for the last 14 years.

—o—

Fred H. Haggerson, president, **Union Carbide & Carbon Corp.,** New York, was given the 1949 medal award for the advancement of research by the American Society for Metals. He was cited as an outstanding example of an industrial leader who has advanced technological progress in broad fields of the metal industries to the ultimate benefit of the consuming public.

—o—

Verne H. Schnee, formerly assistant director, Battelle Memorial Institute, has been named director of the **University of Oklahoma Research Institute.** During the war he was chairman of the products research division, war metallurgy committee, National Research Council, and later was appointed chairman of the committee on ship construction of the division of engineering.

—o—

Julius H. Strassburger, manager, service and maintenance department, and **William F. McGarrity,** assistant to the manager of the steel works department, **Weirton Steel Co.,** Weirton, W. Va., have left for a tour of the western countries of Europe. They will study the use of oxygen in steelmaking, along with other phases of European steel practices.

—o—

Frederick J. Sammerdyke has been

FREDERICK J. SAMMERDYKE

elected executive vice president of **Gunnison Homes Inc.,** prefabricated housing subsidiary of U. S. Steel Corp. at New Albany, Ind. He has been associated with Gunnison Homes for more than two years. He joined the company as assistant to the president and as patent counsel. The post of secretary was added to his duties a year ago.

—o—

John L. Sinclair has been appointed Cleveland district manager, mechanical goods division, **Goodyear Tire & Rubber Co.** He has been associated with the division since 1924.

OBITUARIES...

Charles S. Traer, 59, chairman, **Acme Steel Co.,** Chicago, died Oct. 25. He had just completed 40 years of service with the company. He became president in 1941, serving until April, 1948, when he was elected chairman of the board.

—o—

C. Hubert Lenhart, 46, died in Long Beach, Calif., Oct. 18. He went to California from Pittsburgh in 1942 for Kaiser Co. Inc., iron and steel division, in Fontana. He become vice president of **H. A. Brassert Iron & Steel Co.,** iron and steel consultant, in January, 1949, representing its New York offices on the West Coast.

—o—

Crispin Oglebay, 73, chairman of **Oglebay, Norton & Co.,** Cleveland, died Oct. 23. He joined Hoffman Hinge & Foundry Co., Cleveland, as secretary in 1903. When this organization became the Ferro Machine & Foundry Co. in 1906 he was elected president, retaining that position until 1920, when he was elected chairman of the board, which position he relinquished in 1946. In 1924 he was elected president, Oglebay, Norton & Co., succeeding his uncle, Col. Earl W. Oglebay. Mr. Oglebay was an official or director of 22 other corporations.

—o—

Roy L. Comport, 56, Milwaukee district manager, **National Steel Co.,** Chicago, died Oct. 24 following a heart attack. He had been with the company for 21 years.

—o—

Kenneth J. Cole, 49, Chicago district manager, **Pressed Steel Co.,** died Oct. 24. He had been with the company since 1931, and during World War II had served with the Container Division, War Production Board, in Washington.

—o—

B. A. Patch Jr., 50, Chicago district manager, **Ohio Ferro-Alloys Co.,** died Oct. 17 of a heart attack.

—o—

Irving L. Morris, 84, former treasurer, **Ludlum Steel Co.,** Watervliet, N. Y., died Oct. 18. He was credit manager of Ludlum Steel and later was named treasurer. Mr. Morris retired a year after the merger of Allegheny and Ludlum steel interests.

—o—

Austin S. Murray, 74, for many years general manager, export department, **General Motors Corp.,** in New York, died Oct. 10. He retired in 1925.

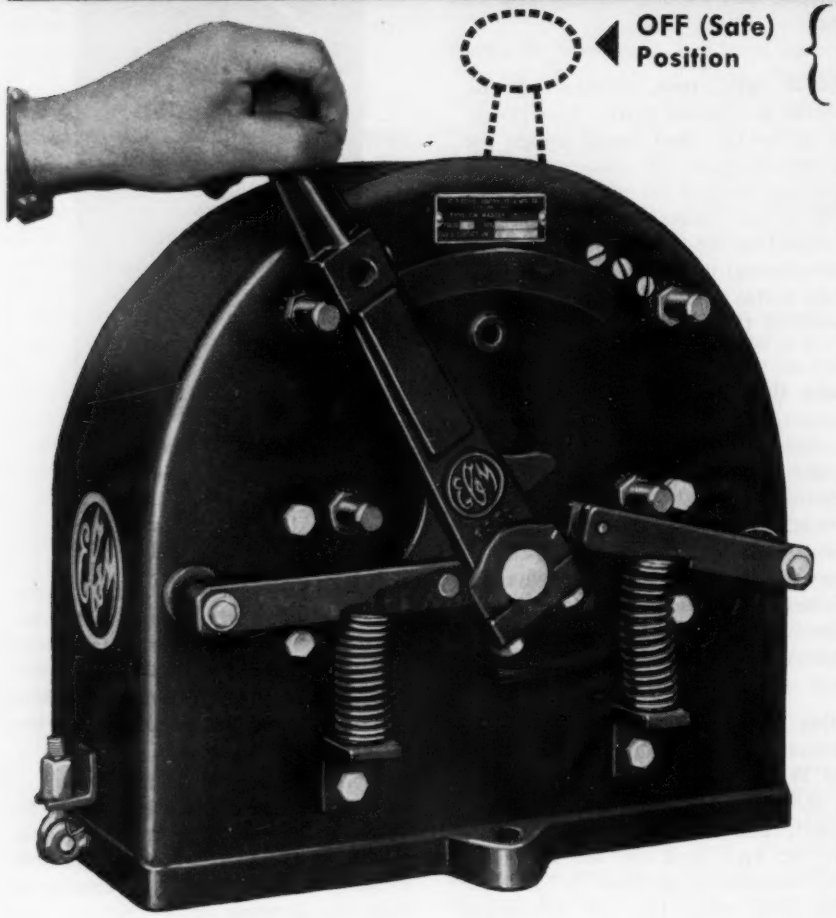
—o—

H. Norman Hoyt, 67, retired purchasing agent, **Anaconda Copper Co.,** New York, died recently at his home in Red Bank, N. J.

—o—

Earl F. Reinhart, 51, president, **Republican International Co.** of New York, tool and machinery firm, died recently in New York. His home was in Michigan City, Ind. He had long been identified with the tool industry and among other affiliations had been a vice president of Latrobe, Pa., Tool Co. from 1931 to 1933, and vice president of United Drill & Tool Corp., Detroit, from 1933 to 1940.

Master Switch *automatically* returns to Off-Position from any speed-point in either direction . . .



Provides Safe Operation should operator fall or otherwise remove his hand from master-handle.

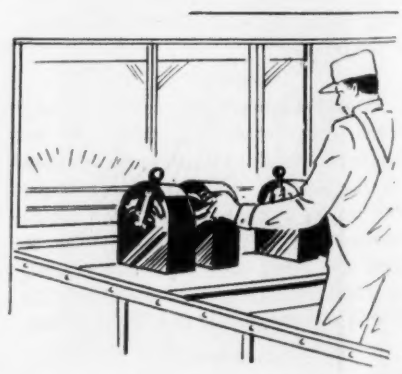
There are several *speed-control* applications where *safe* practice dictates that power be automatically disconnected from the motor-driven machine the instant the operator leaves his station or for some other reason removes his hand from the master switch. A typical example is a transfer (or larry) car with a *spring-return* master switch mounted on the side within reach of the operator as he walks along with the car. Should he trip and fall, the master switch automatically centers itself in the off (safe) position.

The EC&M Cam-type Master Switch (as illustrated) is ideal for this service because of the *short-throw* of the operating handle. From the "full-on" to the "off" position, the handle of an EC&M Master travels less than 40° from the sixth speed-point in either direction to the off (central) position. There's nothing to equal the EC&M Cam Master Switch for spring-return service.

Make your own Compact Layouts with EC&M Bulletin 1190 Cam MASTER SWITCHES

in Crane-cabs or Mill-pulpits

For new installations or when re-vamping existing equipment, take advantage of the narrow width and short-throw of EC&M Cam Master Switches for improved performance. These features appeal to operators.



Write for Bulletin 1190 giving details of these short-throw, narrow width Masters

THE ELECTRIC CONTROLLER & MFG. COMPANY

2698 E. 79th STREET — CLEVELAND 4, OHIO

Production AND Engineering
NEWS AT A GLANCE

FEED CONTROLS CASE DEPTH— Uniformity of case depth on the work processed through an R-F hardening system developed by Westinghouse Electric Corp., Pittsburgh, is obtained by controlled feed emanating from a horizontal rotating scanner that feeds the work through a work coil and spray quench. The system, which selective hardens cylindrical parts at rates up to 6 inches per second, is easily adaptable for hopper feeding into an automatic loading device.

ELECTRONIC TOUCH— An electronic device is employed to actuate the control valve of an automatic welding head currently in use at the Naval Engineering Experiment Station, Annapolis, Md. At present development is employed for research in connection with welding electrodes supplied by research institutions. Another welding head developed here is reported to work as a hydraulic jack released under load. A semiautomatic unit, it consists entirely of hydraulic components minus any gears. A 6-year-old boy using the unit deposited a neat looking bead on the first try.

GIVES MORE SERVICE— A lead alloy for use in the chromium plating industry, developed by National Lead Co., New York, promises to give considerably longer service than those metals it replaces in both industrial and decorative plating operations. When used for tank linings, anodes and heating-and-cooling coils, the company states, the alloy is substantially more resistant to the corrosive and pitting action of chromic acid solutions. Also, it makes anodic treatments of linings and coils unnecessary.

BIG HEATER— Billet heating furnace at Colorado Fuel & Iron's new rod mill in Pueblo, Colo., gobbles up approximately 60 tons of billets per hour. Hearth of the unit is 69 feet long and 26 feet wide. Walls are encased in steel bindings and include vertical expansion joints to allow brickwork to expand freely without rupturing the steel binding when the unit is brought up to operating temperature. Roof is completely suspended from the steel framework, and refractory hanger tiles are employed to hold roof brick in place.

FACILITATES CABLE MAKING— A cable vise developed at the Naval Air Station, Alameda, Calif., facilitates manufacture of wire rope, according to the Department of Defense, Washington. It holds each wire tightly and prevents twisting, making it possible to measure each wire and cut it to the proper length for making up into cables. The vise may be moved up or down the work bench to hold any length or number of wires.

FURTHER STUDY NEEDED— Physical and mechanical properties of the coating as well as the basic metal should be well known in order to utilize pre-plating techniques, Harold J. Read, associate professor of metallurgy, Pennsylvania State College, pointed out recently. This he said is especially true in manufacturing operations involving extensive deformation of metal. One of the prime functions of any electrodeposited coating is to provide protection against corrosion. Until recently, only chemical properties received attention. It is now suspected that at least one mechanical property of the deposit, namely, amount of internal stress, markedly influences corrosion rate.

ENGINEERING "TOOL" — One of the newest alloys developed by International Nickel Co.'s Huntington, W. Va., works is reported to be suitable for many types of engineering applications at all temperatures from subzero to about 1200° F. An age-hardenable form of Inconel, it is particularly adaptable for parts of aircraft turbines and heat engines that require high strength and low plastic flow rate at temperatures above 1500°. Although it cannot be machined as easily as softer metals, it can be machined at practical rates. The metal also can be forged without difficulty, steam hammers being especially suitable for the job as the work can be handled rapidly with minimum chilling. (p. 46)

ATTRACTIVE SURFACES — Although color appearance of a properly chemically-polished aluminum surface resembles that of a bright chromium plate, almost as attractive surfaces are produced by the process on impossible-to-buff, regular mill-finished metal. Physical appearance of chemically processed surfaces varies widely depending on the original condition of the surface, alloy involved, and operating conditions during treatment. Chemical polishing occurs with dissolution of aluminum ranging from 0.0002 to 0.001-inch of surface thickness. Deep mechanical abrasions in the work cannot be removed because the method does not flow metal. (p. 53)

ANTI-"CLINKING" STAINLESS — When heating stainless steel ingots, care must be exercised to prevent great temperature differences between the surface and center of each ingot. If heated fast, the outside of the ingot may become very hot and expand more rapidly than the inside. Result is the metal may tear apart forming a defect known as a "clink". This defect may be avoided by slow heating and preheating. Exact procedure employed depends on type of steel, size of ingots. Individual ingot composition determines if preheating is required. If not, ingot is charged in a cold furnace and heated gradually. Average time of holding a 10-inch ingot at a predetermined temperature is about 5 hours. (p. 64)

Fig. 1—Expanded bellows for airplane engine exhausts.. These Inconel "X" parts were made by E. B. Badger & Sons

SEARCHING for a strong alloy which would be resistant to chemical corrosion and oxidation, and have low magnetic response, International Nickel Co.'s Huntington, W. Va. Works recently evolved a new age-hardenable form of Inconel. The new alloy is suitable for many types of engineering applications at all temperatures from subzero to about 1200°F. Designated Inconel "X", the new metal is particularly adaptable for parts of aircraft gas turbines or other gas turbines and heat engines that require high strength and low plastic flow rate at temperatures up to or above 1500°F.

Forging—The new material can be forged without difficulty. Because of its high strength at high temperatures it requires heavier equipment than would be used for similar work on ordinary steels. Forgings have been made by many drop forging firms and none has encountered any unusual difficulties. Turned round billets supplied by the Huntington Works in such sizes as 8½-inch diameter by 24 inches long, 10½-inch diameter by 26 inches long, 11½-inch diameter by 30 inches long, have been successfully upset into simple flat disks and also in contoured dies from 18 to 29-inch diameter by 3 to 6 inches thick.

Steam hammers are well suited for working the metal because work can be handled rapidly with a minimum of chilling. When the alloy is forged on presses, the metal is in contact with the dies or blocks for a relatively long time and the surface layers may be chilled to temperatures below the correct hot working range. The work should be reheated as frequently as may be necessary to maintain uniform temperature throughout the piece and to avoid ruptures arising from localized chilling.

Recommended techniques for forging, machining and welding International Nickel's new high temperature alloy demonstrate the material's adaptability for such parts as gas turbine rotor wheels, blades and vanes and for jet engine and rocket motor components

Alloy Meets Many Engineering Specifications

In forging, it is recommended that the metal be heated in a furnace whose temperature is held at 2225°F but not above this temperature. Forging should be carried out from this temperature down to 1900° F or possibly 1800° F. Below 1800° F the metal is stiff and hard to move. It is recommended that the work be returned to the heating furnace and reheated to 2225° F whenever the piece drops below 1900° F. Temperature control is perhaps a little more critical on larger forgings and these require greater care to be sure the work is thoroughly heated.

Heating furnaces at Huntington Works are run at 3 to 4 per cent CO in sulphur-free gas. Good results can be obtained in practically neutral atmospheres, e.g., up to 0.5 per cent O_2. Where heating furnaces are fired with high sulphur fuel such as bunker oil, a definitely oxidizing condition must be maintained, i.e., a clear fire with 1 to 2 per cent O_2 in the flue gas.

When billets or bars are heated for forging, it is best practice to support the pieces on rider bars out of contact with any slag, scale or cinder that may be in the furnace bottom. Rider bars may be of nickel (used at Huntington Works and many forge shops), Inconel or stainless steel. Carbon steel riders tend to scale rapidly at the temperatures required for heating Inconel "X".

Forgings should be handled in such a way that they will cool in air. Forgings should not be piled so that the cooling rate is retarded. Retarded quenching in hot water or warm oil may be used on medium size sections if it is thought important to hold the hardness low at this stage. Large sections, e.g. 10-inch diameter, may crack if quenched due to too rapid imposition of stresses arising from differentials of temperature. Current rolling mill practice is to quench rods off the hot mill in sizes from ½ up to 4½ inches. Large sizes, e.g., 8 x 8-inch billets, and small size wire rods, are not quenched.

Many heavy forgings are to be used at ordinary temperatures up to 1100°F. Such forgings may be stress equalized by charging hot into a furnace at 1650°F and holding. This practice has given good results on 700 to 900 pound disk forgings.

Since the metal derives its high temperature properties from heat treatment, it is definitely harmful to apply the so-called "hot cold work" by forging at temperatures in the 1200-1600°F range. This practice should be avoided.

Machining—The metal is a strong and tough alloy and cannot be machined as easily as softer metals. It can, however, be machined at rates that are entirely practical. Many machine shop operations have already been applied successfully to the alloy. The alloy is machineable in all conditions. Whether a specific part is to be machined from solution treated, partially age hardened, or fully age hardened material, depends upon the amount of stock to be removed, upon the finish desired.

In general, for rough machining, where it is desired to remove metal fast with large cuts, this can be done most readily in the rolled and solution treated or forged and solution treated conditions. (140-277 BHN. Hardness varies widely with rate of cooling.)

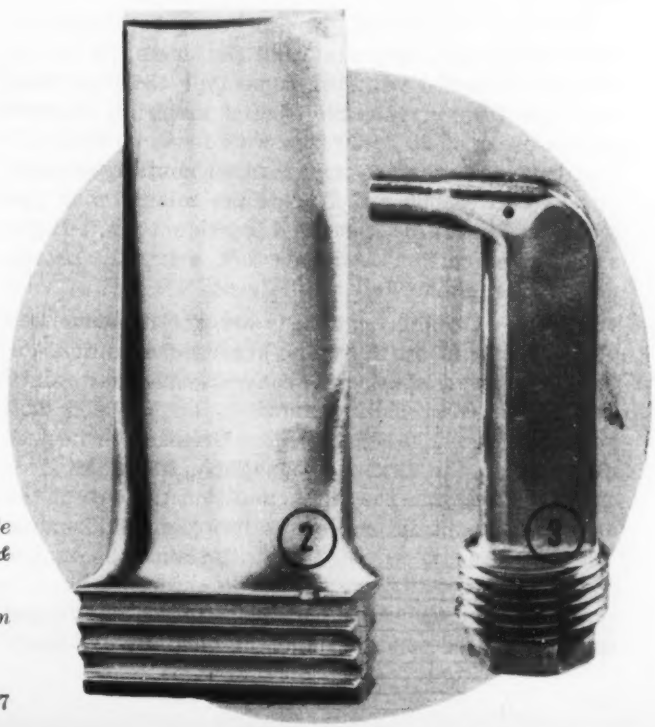


Fig. 2—Small forged and machined gas turbine blade for Westinghouse engine, manufactured by Pratt & Whitney

Fig. 3—A forged instrument part for jet engine system made by Pratt & Whitney

In this condition, the surface may tend to drag and the finish will not be smooth.

When deciding upon the proper condition of heat treatment from which a given part is to be machined, consideration should be given to the nature of the machining operation. Where small diameter holes under ⅛-inch are to be drilled, partially or fully hardened material will present drilling problems. Internal and external threads are difficult to produce in the material in either of those conditions. Where feasible, grinding of threads may be employed.

Heavy, sturdy machines and tools should be employed for satisfactorily machining the alloy. Machines, fixtures, and tools must be strong enough to reduce any chatter or vibration to the vanishing point. Unless this is done, tool life, production rate, size and finish of the parts being made, will suffer.

Cutting-Off—Inconel "X" is readily cut off with aluminum oxide, rubber bonded, abrasive cut-off wheels up to practical limits of size. At the Huntington Works, anything above 6-inch diameter is parted in a lathe. The metal has been cut on power hack saws and machine saws in the soft condition up to diameters of approximately 4½-inches, but this method is slow and it also results in rapid wear of hacksaw blades and machine saw cutters. Parting on a lathe appears to be a more practical method of cutting in sizes where the abrasive cut-off wheels cannot be used. Sheet, strip and flats in the nonage-hardened condition up to ⅛-inch thick have been cut by friction sawing. Standard carbon steel friction band saws with raker set teeth were used.

Turning and Boring — Solution treated material (hardness 77 Rockwell B to 29 Rockwell C—140-277 BHN) is turned with cast nonferrous tools such as Stellite grade 98M2 at 40 feet per minute using up to 0.025-inch feed per revolution. Material in this condition is also turned with cemented carbide tools between 65 and 80 fpm using feeds of 0.015-inch per revolution. Carbide tools such as Kennametal Co.'s grades K3H and K4H or Carboloy Co.'s grades 78B and 907 are suggested.

Age-hardened Inconel "X", including both partially aged and fully aged material (hardness 13 Rc or higher) is turned with the same type tools as those used for turning solution treated material. Speeds on the order of 20 to 30 fpm with feeds up to 0.015-inch per revolution are used for cast nonferrous tools. Speeds between 60 and 70 feet per minute with like feeds are used for cemented carbide tools. High-speed steel cutting tools are not generally recommended for turning Inconel "X".

Drilling—Drilling operations are not recommended on the metal in the fully age-hardened condition. If this becomes a must, use conventional heavy duty web H.S.S. twist drills ground to an included drill point angle of 130-135 degrees. Grind down heel of the drill at the drill point slightly to permit free entry of chips into the flutes, and thin the web at the drill point about 40 per cent of its original thickness. The operating speed of the drill should be in the neighborhood of 10 fpm.

Material in the rolled solution-treated or forged solution-treated condition and the partially age hardened condition can be drilled with conventional H.S.S. twist drills ground to an included point angle of 118 to 130 degrees. The grind at the heel and the web of the drill should be in accordance with that previously indicated for drilling the material in the age hardened condition. The surface speed of the drill should be from 10 to 20 feet per minute. The feed for drills ⅛-inch diameter and smaller should not exceed 0.0015-inch per revolution. The feed for larger diameter drills progresses to 0.005-inch per revolution. The increase in feed must be proportioned to the diameter of the drill.

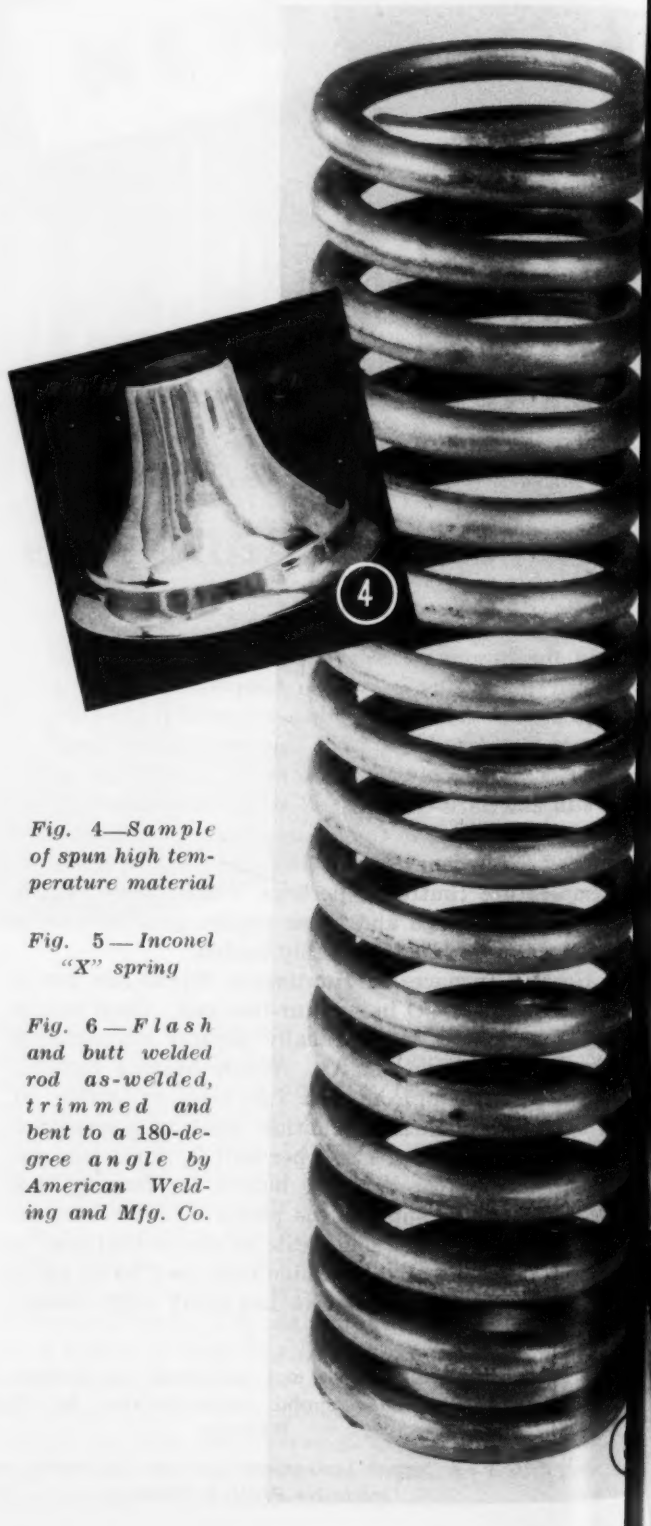


Fig. 4—Sample of spun high temperature material

Fig. 5 — Inconel "X" spring

Fig. 6 — Flash and butt welded rod as-welded, trimmed and bent to a 180-degree angle by American Welding and Mfg. Co.

Single-flute, deep-hole (gun type) drills tipped with cemented carbide perform satisfactorily on the metal in the partially age-hardened condition. Drilling speeds on the order of 80 to 100 fpm with feeds to 0.0005-inch per revolution have proved satisfactory. Small diameter holes, say under ⅛-inch, are difficult to drill. Only solution treated material is recommended for such drilling. Short drills should be used for all drilling operations and when possible, a drill bushing incorporated in the setup. Furthermore, the work and drill should be flooded with cutting lubricant making every effort to get the coolant to the cutting points of the drill.

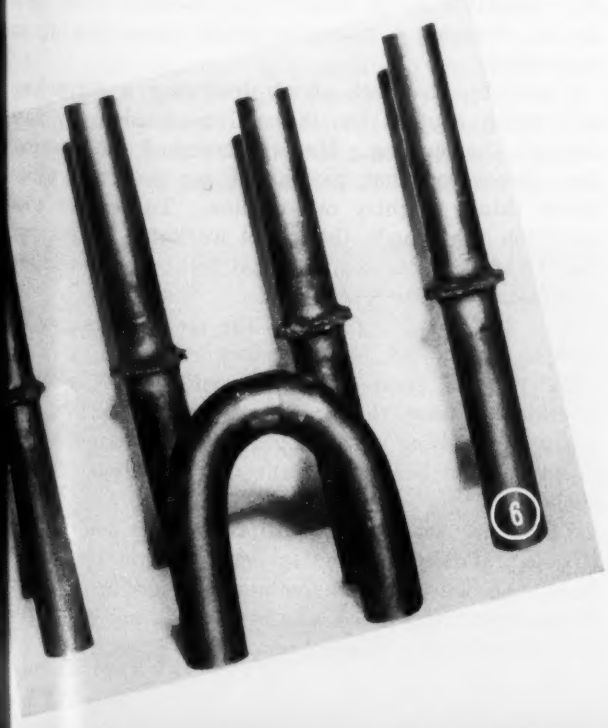
Milling—Experience on milling the alloy is confined to high-speed steel cutters. Surface speed of high speed steel cutters for milling operations should be held to 20 to 40 feet per minute. Feeds should be on the order of 0.002 to 0.005-inch per cutter tooth.

Plain or slab milling can be done with coarse tooth cutters having helical teeth ground to a rake angle of 12 to 13 degrees. Clearance on the periphery of the teeth should not be more than enough to prohibit drag. Face milling with high speed steel inserted tooth cutters has been carried out quite satisfactorily on partially and full age-hardened material.

Slitting—Slitting is best performed with a staggered tooth saw with alternate teeth of opposite helix. Clearance on the periphery of the teeth should be held to the minimum that prohibits dragging.

The material can be broached in either the solution-treated partially age hardened or the full age hardened condition. The age hardened material will cut cleaner but offer lower life per grind to the broach. The material in both conditions has been broached at 6 fpm. High speed steel of the 18-4-2 analysis has been used for the broach material. Broaches should be hardened and tempered to a hardness in the neighborhood of 64 Rockwell C scale.

Welding—Several different types of welding operations have been successfully demonstrated on an experimental basis with the material in bar stock forms and in sheet and strip. Some commercial production welding has been done but the total experience to date is not sufficient for a basis of hard and fast rules.



The metal can be welded by nearly all commonly used methods including metal arc, inert gas metal arc, atomic hydrogen arc, resistance spot and seam, resistance butt welding.

Metallic Arc Welding—Sound welds having good ductility have been produced by hand welding the material with INCo "132" metallic arc electrodes. The welds have been x-rayed and found to be free of porosity and cracks. All fractures have been pore free and of normal silky appearance. It is well known that the high nickel alloys "freeze" very rapidly and this fact must be taken into consideration when welding with "132" Inconel electrodes. The majority of trouble, when it appears, is usually found in the restrike areas. Therefore, it is essential that the proper technique be used in making restrikes.

Each electrode, as it is inserted in the electrode holder, should be examined to be certain that the flux coating extends to the end of the core wire. Electrodes that have been slightly damaged at the end should be burned off to where the unfluxed area is eliminated.

A "T" type pick-up should be used for the restrike. This consists of starting the arc at the forward or leading edge of the crater and carrying the arc to the rear edge of the crater at a speed slow enough to allow the deposition of a small drag bead. When the rear edge of the crater is reached, weaving should start across the full weld width. Direction of welding is reversed and the welding carried on. As the arc makes its second or weaving traverse of the crater, the short drag bead will be remelted.

This type of pick-up has three major functions. First, it gives the welder an opportunity to establish the correct arc length before weaving starts. Second, it preheats the crater; any cold shuts or gas pockets present in the area directly over the crater are given an opportunity to escape when the second melting of the crater area takes place. The metal deposited in the small drag bead across the crater is quenched or frozen very rapidly and ucually this solidification occurs before the gas can escape.

The condition wherein the gas is trapped in rapidly solidifying metal also exists in the crater as the forward half of the weld puddle is generally rather thin and when the arc is broken solidifies more rapidly than the full thickness bead. Gas or cold shuts in the crater arc area are removed by various abrasive wheels manufactured for the dressing or cleaning of welds. It is recommended that all craters be ground rather extensively before each restrike is made.

Inert Gas Metal Arc Welding—Acceptable welds joining 0.025 to 0.093-inch thick sheets have been made by the inert gas metal arc process, using either argon or helium gas for the inert atmosphere. The welding progresses readily, but reasonable care should be used to maintain an arc length not exceeding 0.125-inch. Helium is preferred slightly over argon. Whichever gas is used it (*Please turn to Page* 74)

SEEN AND HEARD IN THE Machinery Field

By GUY HUBBARD
Machine Tool Editor

SMALL LOT ECONOMY: Throughout the 17th annual meeting of the American Society of Tool Engineers which I have just been attending at Montreal, strong emphasis was placed by Payson Blanchard of The Bullard Co., and by several other speakers, on the fact that the economies possible through modern machine tools by no means are confined to big lot production.

This lesson applies to many industries in Canada which do not enjoy the mass markets available in the United States and which at the same time have to compete with mass-produced goods from the States. It is a lesson which should be heeded by production engineers in the United States who undertake to tool up—or dictate methods of tooling—branch plants in Canada. Costly setups which are economically justifiable in the States in many instances must be simplified for use on similar products in Canada.

My impression is that tool engineers of many limited production industries in the States—including machine tool builders—can learn much from Canadian tool engineers who are experienced in making high production machines serve multiple purposes which will keep them busy all the time. They also can learn much from Canadian product designers who have modified small parts for multiple production on big planers, surface grinders, milling machines, etc., which otherwise would be busy only part of the time machining big parts. In no other way could the big, expensive machines be justified.

The same philosophy applies to use of machines such as turret lathes in tool rooms. If enough attention is paid to how enough jobs can be handled on machines of that type, it will be found profitable to apply them to lots such as a dozen reamer blanks, for example.

CHAPIN FOREST: On October 15 I was among several hundred who attended the civic luncheon at which Mr. and Mrs. Fred H. Chapin handed to Gov. Frank J. Lausche the deed to the 361-acre Gildersleeve Forest, which they have presented to the state of Ohio. This tract, which is in the neighborhood of Cleveland, was destined for the lumberman's ax when the sudden and generous impulse of Mr. and Mrs. Chapin saved it for the benefit of the people of Ohio.

Most of us know Fred H. Chapin as a machine tool builder who for many years has been president of the National Acme Co. of Cleveland. Too few of us have known him as a nature-lover whose admiration for the beauty of unspoiled forests is combined with practical appreciation of what forest preservation means to the economic life of this country.

Years ago, when Mr. Chapin was a vice president of the Bourne-Fuller Co. of Cleveland, he had first-hand experience with the costly troubles caused by the silt-laden waters of the Cuyahoga river which winds and twists through the heart of Cleveland's steel producing area. Rich soil eroded from denuded areas at the river's headwaters then did and still does come down to clog the pipe lines of the industrial plants and to "silt up" the navigable portion—requiring constant, costly dredging at taxpayers' expense.

Later on, in the fall of 1927, came the great flood of the Connecticut river. One of the industrial victims of which was the Gridley Automatic plant, a branch of National Acme Co. then located at Windsor, Vermont. Nearly six feet of muddy water flowed through that big plant. Years of heavy lumbering operations around the Connecticut lakes unquestionably contributed to this catastrophe—which in turn contributed to the giving up of the plant by Mr. Chapin's company.

In accepting the generous gift of the Chapins, Governor Lausche said: "Our nation is young. We have seen what has happened to Egypt, to Babylonia, to Greece. May we profit by that knowledge. Conservation is the topic of today."

The lesson to be drawn from the "Chapin Forest" case is that if the land is used properly in the rustic upper valleys, rivers will cease to be a menace to industries in their lower valleys. It is high time to learn that lesson.

CAN IT BE ASSEMBLED? The case of the show-off who puts the billiard ball into his mouth and then discovers that "special tools" are required to remove it, is paralleled by a mechanical problem which was demonstrated to me when I visited the K. R. Wilson shop in Arcade, N. Y.

In designing automotive service tools, the engineers of that organization discovered that the only possible way to get the "innards" in or out of a certain rear axle assembly is to stretch the opening—just as a dentist stretches a patient's mouth when making an impression.

Therefore, they set about designing a stretching tool which enables the internal mechanism to pass through the opening. Having stretched the opening, they discovered that permanent set occurred which threw things slightly out of line. To correct that condition they made their tool workable in reverse, so that after stretching, it would pull things back into alignment.

This is a good example of the troubles caused by designs which look fine on paper but which give assemblers and service men headaches and skinned knuckles because the draftsmen failed to take into account the swing of wrenches and the room required to introduce subassemblies through openings and into pockets.

There are several ways to forestall such difficulties, in addition to practical visualization by draftsmen. An increasingly common method in the case of mass produced items is to build mock-ups or models prior to going into production.

UNUSUAL SCREW MACHINE OPERATIONS

Buick setups adapt automatics to machine long shifter lever, helical grooves on speedometer shaft with single-point tool and cross drill small stepped control valve

By HERBERT CHASE

Fig. 1—Transmission control lever produced by Buick on an eight-spindle Conomatic

UNUSUAL and possibly unique screw machine operations are used in plant 28, Buick Motor Division, General Motors Corp., to turn out automobile components on a large scale. Probably 90 per cent of the screw machine output is produced on fairly conventional setups, but the other 10 per cent involves some extremely interesting tooling.

Most car makers use forged steel gear shifter levers but Buick simplifies production and avoids forging by making the lever itself, Fig. 1, in a multiple-spindle automatic screw machine and later adds to the shaft a ball, also a screw machine product. The shaft is SAE 1118 hot rolled steel and has a finished length of 9-5/64 inches which, for a maximum diameter of ½-inch is unusually long for production on an automatic. The ½-inch stock is purchased in coils and run through a Schuster straightening machine before cutting into bar lengths.

Eight-Spindle "Job"—Machining is done in an eight-spindle 1⅝-inch Conomatic. After feeding to length in the first position, the taper is partly formed in the second position and chamfering is done at thread end, Fig. 2. A roll support acts as a steady rest during this and subsequent operations. In fourth position, the ⅜-inch diameter is formed and the small diameter of the taper is finish formed. Then, in the fifth position, the thread diameter is turned and the 0.366-0.370 and the 0.3727-0.3742-inch diameters are shaved.

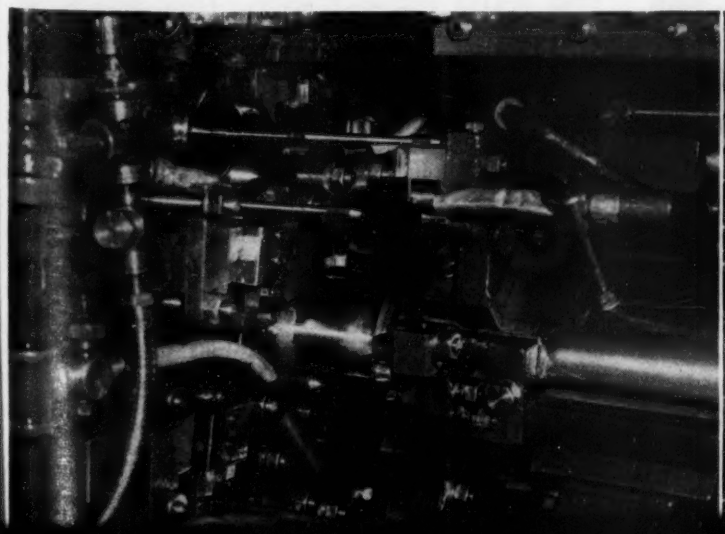
At the sixth position, the 0.300-0.303-inch spherical radius is formed, as is also the 5/16-inch diameter while the end is faced and chamfered. Next, in the seventh position, the spherical radius and 5/16-inch diameter are shaved. This completes the screw machine operations except for cutoff done in the eighth position and the piece falls into a chute, Fig. 3. One hundred levers per hour are produced. The thread is then rolled in a Waterbury-Farrel machine.

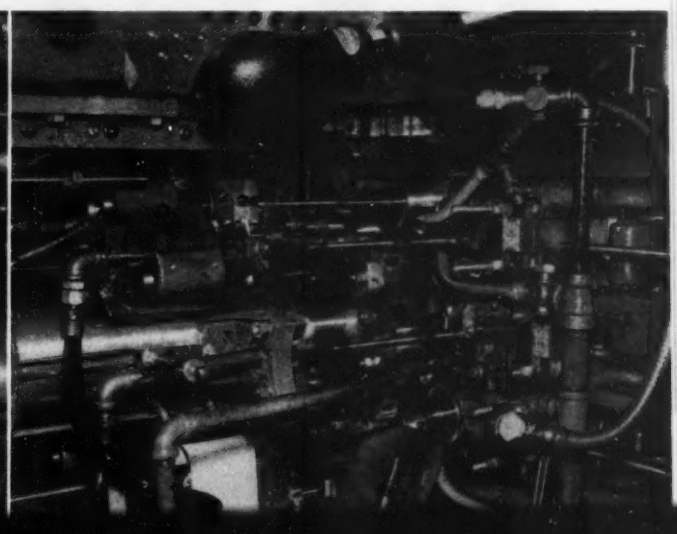
After washing and then grinding off the teat, the lever goes through two Cincinnati centerless machines for rough and finish grinding the taper form as a preliminary to plating.

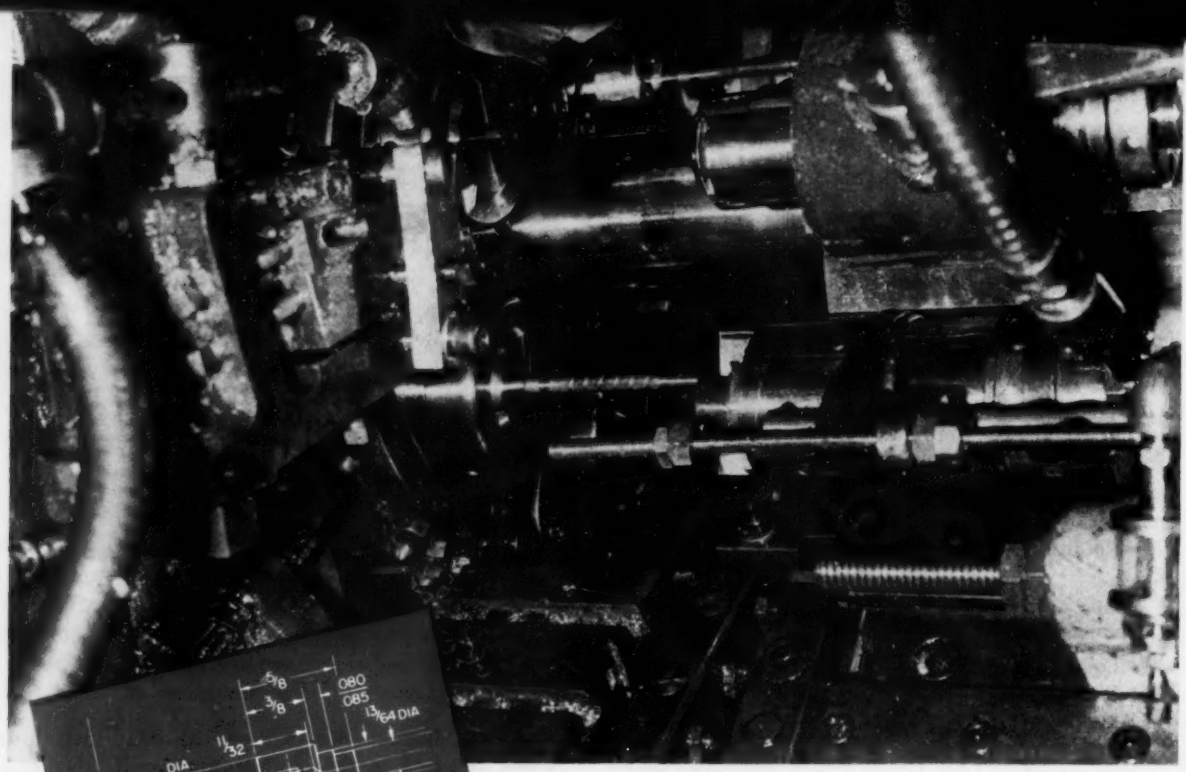
Tool Saves Operation—Unusual in some respects is the speedometer drive shaft. This part requires, on its outer bearing diameter, a helical oil groove of 5/16-inch lead. Until recently, this groove was produced after screw machine operations were completed but it is now cut in the screw machine, Fig. 4, by a single-point tool held in a conventional collapsible threading die head. This special tool is applied to a chaser head fed in from the end with the work held stationary (not rotating) in the fourth position of a

Fig. 2 (left)—Setup for control lever production as it appears from front of machine. Tooling at first four stations is shown

Fig. 3 (right)—Rear of Conomatic setup showing tooling at last four stations. A completed control lever just cut off is in the chute







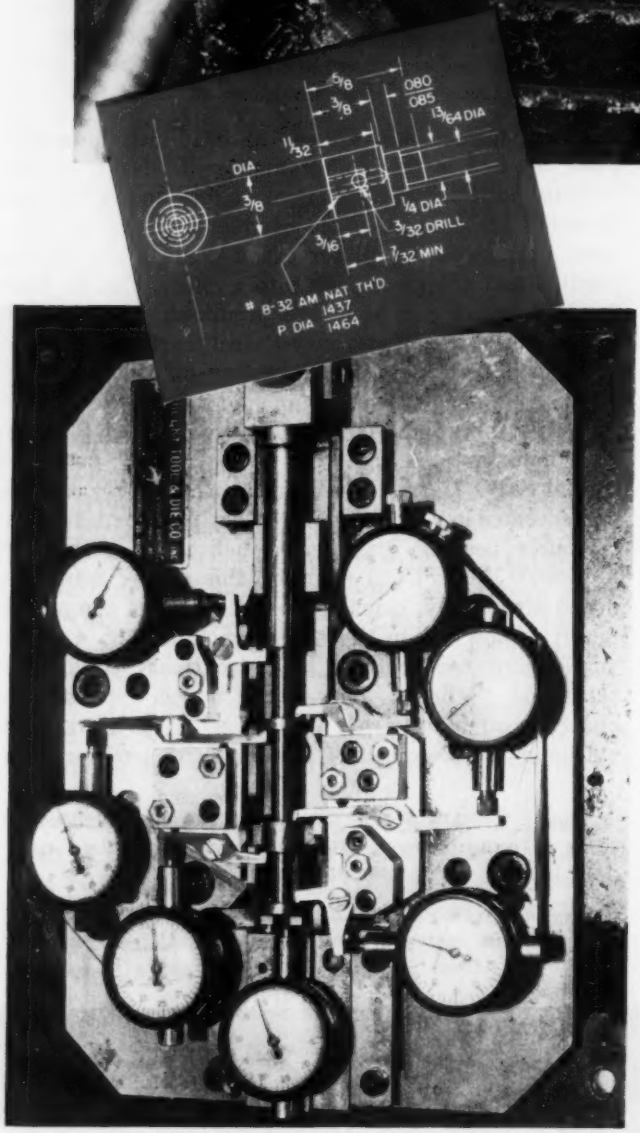


Fig. 4 (top)—Closeup showing part of tooling in a six-spindle Acme-Gridley, especially tooling at station in which the helical oil groove is chased on outside diameter of drive shaft

Fig. 5 (center)—Control valve wire trunnion produced in a six-spindle Acme-Gridley, including drilling of crosshole

Fig. 6 (bottom)—Fixture in which Dynaflow main control valves are gaged for overall length and length to each shoulder

six-spindle, 1-inch Acme-Gridley screw machine. The head is advanced by a lead cam as rotation of the chaser cuts the groove. Then the head expands enough to clear the tool and backs off automatically. This saves a separate setup and operation in another machine.

This part is cut off in the fifth position and subsequently is set in a special swaging die in a No. 3 Bliss press which, in a single blow, closes in a ¼-inch length of the tubular portion to form an internal square 0.105-0.108-inch on a side and having sharp corners. A square pin fitting this square hole drives the shaft, when assembled into the speedometer, and the oil groove keeps grease from feeding upward along the shaft.

Cross-Drills in 2 Seconds—A part termed a control valve wire trunnion, Fig. 5, is produced in a six-spindle 1-inch Acme. Most of the operations are conventional but cross drilling is performed in the second position before the axial hole is tapped in the third position. Cross drilling is done in 2 seconds by a 3/32-inch high speed steel drill driven at 3600 rpm by a separate motor mounted on a cross-slide. Total time per piece is about 4½ seconds.

Valve spring cap keys are among parts made at high speed in Brown & Sharpe 2-G screw machines from X-1112 cold draw stock. These keys are produced as rings that are tapered on the outside diameter with a form tool. After drilling, reaming and cutoff, the ring is automatically transferred to a sawing attachment and is then cut in two with a 1/32 x 2-inch slotting saw having 72 teeth. The time per pair of parts is 15 seconds. Keys are tumbled in emery stones to remove burrs before heat-treating.

Main control valves for Dynaflow transmissions are produced at the rate of 100 an hour in multiple-spindle machines having fairly conventional tooling but overall length and distances from one end to all shoulders have to be held within ±0.005-inch limits. The dial gage setup, Fig. 5, is employed to check these dimensions rapidly.

Can You Use Chemical Methods in

FINISHING ALUMINUM?

Wide variety of protective and decorative finishes for aluminum can be produced economically by strictly chemical processes. Surface conversion coatings, frosted finishes, diffuse reflector finishes, various types of etched surfaces, chemically produced oxide coatings and a method for producing bright chemical polish on aluminum by dipping are described here

A GREAT variety of strictly chemical methods is finding more and more application in finishing aluminum. The use of adherent, inorganic protective coatings on aluminum has long been recognized as efficacious in reducing corrosion rate and prolonging paint life. Surface conversion coatings, which are formed by chemically converting the metallic surface have as their objective the formation of a stable and nonreactive coating, integral with the base metal, which inhibits corrosion and increases the adherence of applied organic finishes.

Chemical finishing methods also include the frosted finish, diffuse reflector finish, various types of etched surfaces and chemically produced oxide coatings. Recently a method for producing a bright chemical polish on aluminum by a dipping operation was described.[1] Chemical finishing processes can produce surface effects not possible by mechanical or electrochemical methods.

Surface Conversion Processes—Surface conversion

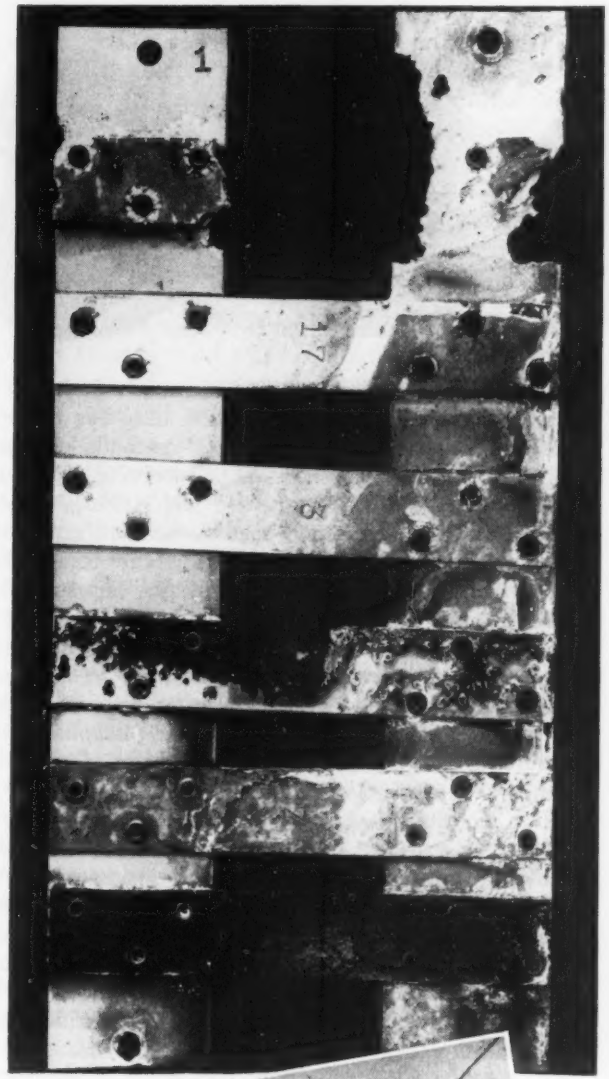


Fig. 1 *(above)—Tests showing effect of proper chemical treatment in preventing couple corrosion. The 28 aluminum strip on left* (1) *was chemically treated to produce an amorphous phosphate coating, while one on right was untreated. Various metals were used as cross pieces. Exposure time was* 21 *months on a roof in a semi-industrial atmosphere*

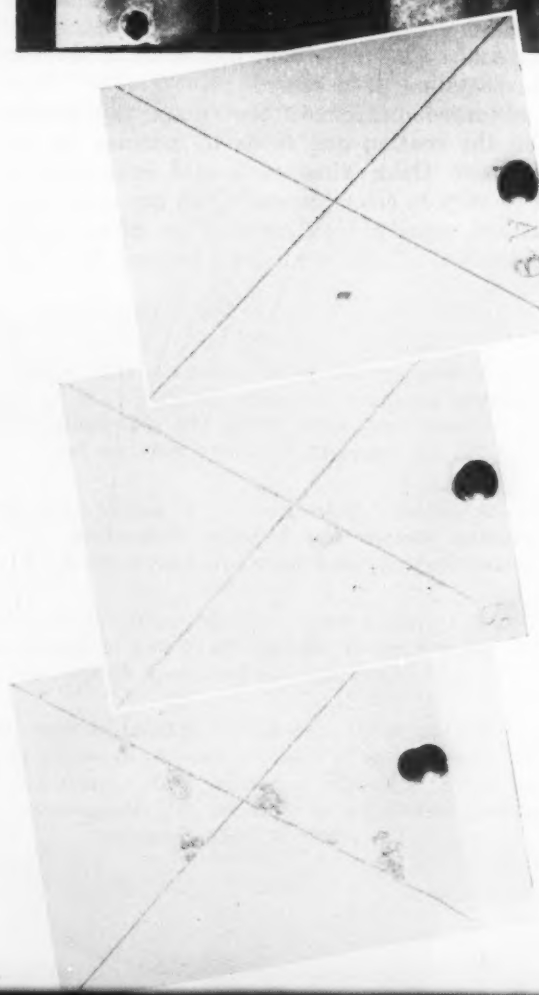
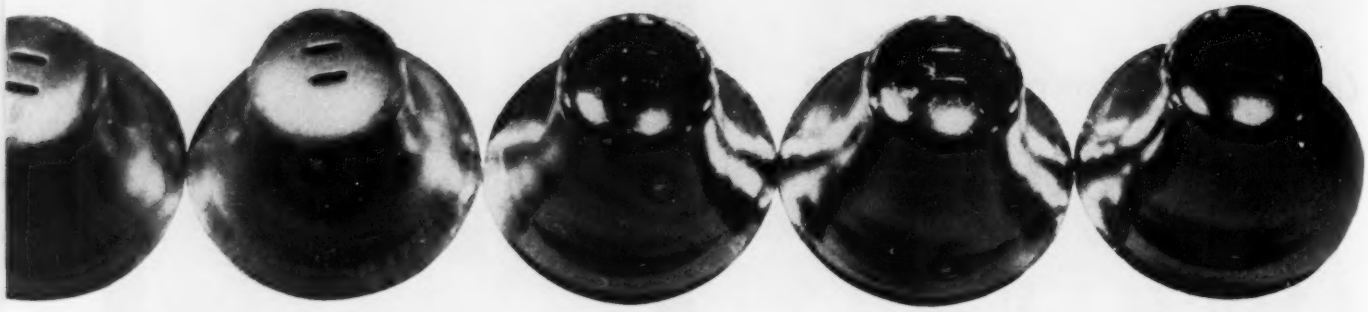


Fig. 2 *(right)—Panels shown illustrate effect of chemical treatment on salt spray of panels painted with a single coat of white synthetic enamel designed for washing machine use. From top to bottom, panels were given amorphous phosphate coating treatment and* 22,000 *hours salt spray; chromic acid anodized and* 5800 *hours salt spray; chemically oxidized and* 2400 *hours salt spray*



processes are the only methods in use which prepare the surface of aluminum as a good base for an organic finish. Some of the common methods of converting aluminum surfaces not involving electrochemical anodizing operations are acid etching, treatment with phosphoric acid-organic solvent mixture, production of chemical oxide coating and formation of phosphate coating.[2] One type of phosphoric acid-organic solvent mixture is a surface preparation made up of an aqueous solution of phosphoric acid with organic grease solvents and emulsifiers. The mixture is usually applied by brush-on or dip, and probably forms a thin film of aluminum phosphate on the surface of the metal. (U. S. Army Corps of Engineers specification T-1184-D.)

Oxide coatings may be produced on aluminum surfaces by certain chemical treatment processes. Patents pertaining to some of these processes have been granted to Aluminum Co. of America. One method specifies immersion of the work in a hot (about 150° F) solution of 2 per cent sodium carbonate and 0.1 per cent potassium dichromate for a period of about 20 minutes. Pores of the oxide film thus formed are sealed by a subsequent immersion in a hot solution of 5 per cent potassium dichromate and the parts are then rinsed.

The absorbed dichromate neutralizes any residual alkali in the coating and tends to increase its protective power. Oxide films so formed have been reported to vary in color, depending on the alloy treated, but are usually a yellowish-green after sealing in dichromate. Oxide coatings produced by chemical means are thinner, softer, and more porous than those obtained by anodic processes. However, in general they are more economical and easier to apply. These coatings may be dyed; however, it has been reported that the colors obtained are not so good as those on electrochemical oxide films.

More recent developments in chemical methods for finishing aluminum has been the chemical production of phosphate surface coatings. In one method[2] of this kind, known commercially as Bonderite, developed by Parker Rust Proof Co., Detroit, coatings consisting essentially of zinc and aluminum phosphates are formed on the aluminum surface by treatment with zinc phosphate solutions containing fluoboric acid. Recently, data were presented[4] on the "Alodine" process which is described by American Chemical Paint Co., Ambler, Pa., developers of the process, as producing an amorphous phosphate coating on aluminum surfaces. One outstanding feature of this chemically treated surface is said to be a high degree of salt spray corrosion resistance on unpainted aluminum.

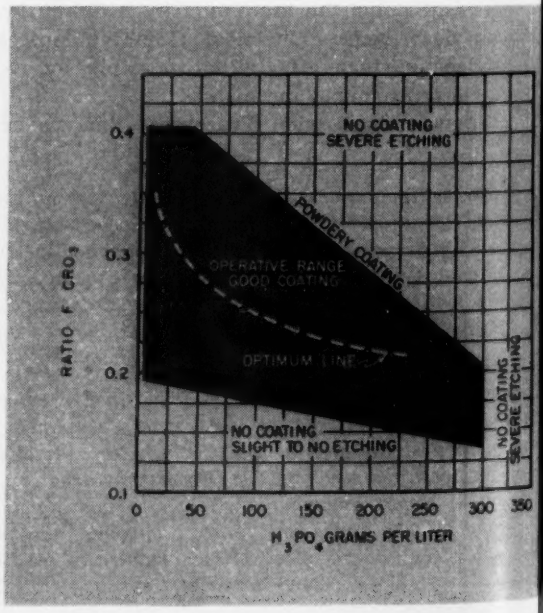
Bonderite Process—The Bonderite phosphate coating process may be carried out by immersion or spray application in the same type of equipment and with similar cycles as used for processing steel and zinc. Production of the coating involves the following typical steps: (1) Clean work thoroughly by immersion in a mild inhibited alkaline cleaner, by solvent cleaning, or vapor degreasing. (2) Immerse cleaned and rinsed metal in the Bonderite solution maintained at a temperature of about 160° F, for

Fig. 3 (above)—Alloy 3S aluminum bells before and after chemical polishing by a dip treatment. Note high degree of specular reflectance from the chemically treated bells on right. Courtesy Enthone Inc.

Fig. 4 (right)—Chart from U. S. patent 2,438,877 showing operative ranges and solution composition for producing the amorphous phosphate Alodine coating on aluminum

Fig. 5 (right, center)—Weight in milligrams per square foot, of coating at various times and temperatures by immersion application of Alodine

Fig. 6 (far right)—Aluminum dissolution rates in acid solutions appear to be related to ability to chemically brighten the surface. Results obtained for a typical alloy in tests recently conducted in Enthone Co. laboratories are shown. (120° C, mild agitation)



2-4 minutes. This converts the metal surface to a uniform phosphate coating. The solution has been described as containing zinc phosphate, nitrate and fluoborate. (3) Rinse thoroughly in cold water for about 30 seconds immediately after treatment in the phosphate coating bath. (4) Immediately after the water rinse, the work is rinsed for about 30 seconds in a dilute solution (about 0.05 per cent) of chromic acid (sometime phosphoric-chromic mixture is used here), maintained at a temperature of about 180° F. (5) Dry parts thoroughly prior to painting.

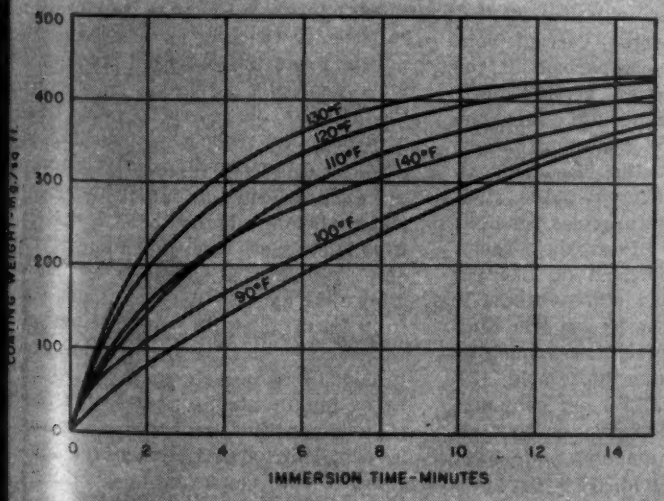
The phosphate coating weights obtained by the process are reported to vary from 100 mg. to 2 grams per square foot of surface area, depending on the method of application of the coating solution and the type of metal pretreatment used. Outstanding features of the process are that it aids paint anchorage appreciably, and tends to prevent paint film failure.

Alodine Process—This process, described as producing an amorphous phosphate coating on aluminum surfaces, was first introduced by American Chemical Paint Co. early in 1945. Data recently presented on the coating process[4] indicate that the main constituents of the coating are chromium phosphate 50-55 per cent; aluminum phosphate 17-23 per cent; water 22-23 per cent. From these analyses, it might be assumed that the coating would have the conventional crystalline structure associated with other types of phosphate coatings. However, according to work carried out by American Chemical Paint Co., microscopic examination, as well as both x-ray and electro-diffraction studies have failed to show any crystalline pattern or definite defraction pattern.

Processing Steps—Steps recommended for producing the amorphous phosphate coating known as the Alodine coating consist essentially of the following: (1) Remove surface contaminants by essentially conventional means. (2) Rinse free of any adhering alkali. (3) Treat for a short time in the Alodine solution. This solution consists essentially of a mixture of chromic, phosphoric, and hydrofluoric acids in certain well defined proportions. Fig. 4, a chart reproduced from U. S. Patent 2,438,877 gives the operative ranges of the solution in terms of phosphoric acid concentration and the ratio of F:CrO_3 for solutions prepared with an alkali fluoride. (4) If the aluminum being processed is not to be painted, for maximum corrosion resistance it is dried at elevated temperature without rinsing, For this application the process is considered complete at this point. (5) If the aluminum is to be painted the work from steps 3 or 4, above, is rinsed with clean water. (6) work is given a final rinse in dilute chromic or phosphoric acids, or a mixture of both. (7) Work is dried. Coating may be applied to aluminum surfaces by immersion, spraying, or even by brushing. The developers of the process have pointed out that considerable latitude is allowable in the concentration of all components of the solution without adversely affecting its coating properties.

Proper Cleaning Important — In general, cleaning procedures prior to the phosphating operation may be of conventional type. However, it is important that traces of adhering alkali be removed by very thorough rinsing, as they cause the formation of a loose and powdery coating on the surface. Use of a slightly acidulated rinse is preferable. Instances have been cited where improper rinsing has resulted in contamination of phosphate processing solutions.

Coating Thickness—Generally, weight of the amorphous phosphate coating increases with processing time, bath strength, and bath temperature. This is shown graphically in Fig. 5 for the immersion type of treatment. It has been pointed out that ordinarily there is no perceptible change in the overall dimensions of the metal processed because the thickness of the coating is about equal to that of the aluminum dissolved. However, since the amorphous phosphate coating has a greater density than aluminum, there is an overall gain in weight of processed metal.



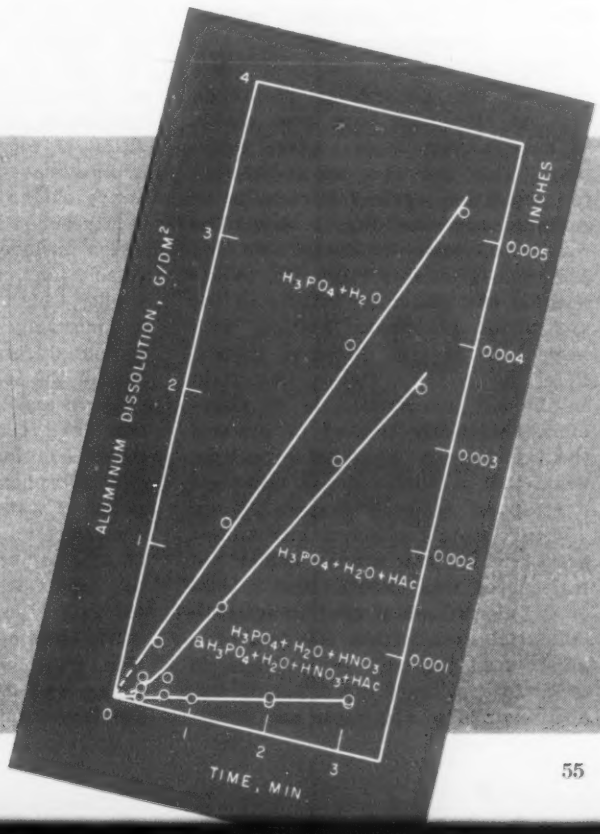


TABLE I

COMPARATIVE SALT SPRAY RESISTANCE RATING AFTER 1500 HOURS EXPOSURE

Aluminum Surface Coating or Treatment	Type of Paint System	
	Baked Enamels	Air-Dry Enamels
Chromic Acid Anodized		
Non copper bearing alloys	9.7	7.0
Copper bearing alloys	8.0	5.5
Sealed Alkaline Chromate-coated		
Non copper bearing alloys	8.0	6.0
Copper bearing alloys	5.5	4.0
Zinc Phosphate Coated		
Non copper bearing alloys	6.5	4.0
Copper bearing alloys	5.0	2.5
Solvent wiped only		
Non copper bearing alloys	3.5	1.5
Copper bearing alloys	1.0	0

In this table a rating of 10 indicates no visible failure; 0 indicates complete failure.

Salt-Spray Resistance — Primary importance of many chemical treatment processes for aluminum is their paint bonding and under-paint corrosion-inhibiting properties. However, data available[4] on salt spray resistance of unpainted Alodine treated aluminum surfaces show this type of chemical treatment to impart a considerable degree of corrosion resistance when used without subsequent application of organic finishes. The result of tests conducted by American Chemical Paint Co. on the salt-spray resistance of treated aluminum, subsequently painted is shown in Fig. 2. It depicts three panels of 52S aluminum alloy, each painted with a single coat of white synthetic enamel designed for washing machine use. These panels were respectively (top to bottom, beginning with A9) Alodized, chromic acid anodized, and chemically oxidized by a proprietary process. It was reported that the elapsed time to removal from salt spray were respectively 22,000 hours, 5800 hours, and 2400 hours. Table I based on American Chemical Paint laboratory tests shows the comparative salt spray resistance of several different types of chemically treated surfaces, subsequently painted.

Couple-Corrosion — Chemical coatings of the amorphous phosphate type on aluminum have been shown to have a very high surface resistance. This indicates an application for protection against bi-metallic or galvanic corrosion. Fig. 1 shows the results of tests conducted by the American Chemical Paint Co. to determine the insulating effects of the amorphous phosphate coating with respect to several different metals. Referring to this figure, the strip on the left, uncorroded, is 2S aluminum chemically treated to produce the amorphous phosphate coating, while that on the right is uncoated.

Strapped between the strips are different metals attached with hollow brass rivets. The whole "ladder" of test pieces was exposed for a total of 21 months on a roof in a semi-industrial area within 100 feet of a much used railroad. In addition, in order to accelerate the effect, it was also exposed to 150 hours salt spray. The cross pieces in Fig. 1 are, reading from the top, as follows: Magnesium, untreated (corroded away); 17ST aluminum; 3S aluminum; chrome plated steel; galvanized iron; and tin plated steel.

It can be noted that in all cases there is notably less corrosion of the coated strip at the points of bi-metallic attack than on the untreated strip, showing that the treated strip offers considerable protection against galvanic corrosion.

Chemical Brightening Aluminum— Recently, research work carried out a method for chemical brightening and polishing of wrought aluminum alloys has been reported.[1] The studies made under this program showed that mixtures of phosphoric acid, nitric acid and water had the property of brightening and polishing, when wrought aluminum alloys were immersed for varying lengths of time, 15 seconds to 10 minutes, at temperatures ranging from 210 to 280°F. The fact that certain acid solutions will brighten and polish while others will merely etch wrought aluminum alloys appears to be related to the solution rate of the alloy. Fig. 6, based on recent work conducted in the Enthone Co. laboratories shows the rate of dissolution of a typical aluminum alloy in acid solution. Reduction in solution rate with the addition of nitric acid is accompanied in most cases by an increase in brilliance of the finish obtained.

Experiments were carried out which included a comparison of the dissolution properties of the high copper, high magnesium, and the commercially pure aluminum alloys in four different baths. The composition of the four different baths, studied, expressed in gram moles per liter, was as follows: Phosphoric acid-water solution consisted of 13.4 per cent phosphoric acid (ortho) and 17.9 per cent water. The phosphoric acid-water-acetic acid solution consisted of 11.7 per cent phosphoric acid, 15.6 per cent water and 2.6 per cent acetic acid; the phosphoric acid-water-nitric system was made up of 13.4 per cent phosphoric acid, 17.0 per cent water, and 0.58 per cent nitric acid; the four-component, phosphoric acid-water-acetic-nitric system was composed of phosphoric acid 11.3 per cent, water 14.8 per cent, acetic acid 2.6 per cent, and nitric acid 0.50 per cent. Results obtained in the experiments with respect to the surface finish on aluminum are summarized in Table II.

Chemical Polishing of Aluminum— Chemical polishing of aluminum on an industrial scale from solutions composed primarily of phosphoric acid, nitric acid, and water may introduce the finishing engineer to an entirely new set of operating problems. A few that must be considered are as follows: (1) Operation of baths at elevated temperatures produces high vaporization losses which not only produces an unusual exhaust problem but also changes the bath composition; (2) time and temperature to reach the optimum brilliance of finish will vary with the alloy and perhaps with its temper; (3) drying must be accomplished without water spotting; and (4) materials for construction of equipment must be carefully selected.

According to the work reported from the Enthone Laboratories[1] three variables are known to affect the polish obtained on a given aluminum part. They are: Chemical composition of the bath, operating time and temperature. In order to determine the proper conditions to use for a specific aluminum part with a given solution composition, test runs should be made in the plant to determine the optimum cycle. Thus, typical parts to be processed should be dipped for varying times at varying temperatures.

In using a bath of the basic composition described above, it has been suggested[1] that the range of 180 to 280° F be covered, with dipping times of from 15 seconds to 5 minutes. It is important that these tests be run on the actual parts since spinning, drawing, and other forming operations appear to change the temper sufficiently to have an effect on the polish. From the practical standpoint it is generally advisable to operate the bath at the lowest possible temperature that will give polishing in order to minimize vaporization losses.

Recommended equipment for chemical polishing baths of the above type is stainless steel tanks and racks employing welded assembly. Stainless alloys 321 and 237 have been successfully used in tank construction. A satisfactory heat source should be provided. Some chemical polishing baths for aluminum, notably the acetic acid modification of the phosphoric acid, nitric acid, water combination liberate sufficient heat during the polishing reaction that they must be cooled in operation. In addition,

WHY

THIS COMMUTATOR Can Stand The Most Rugged Service, Yet Costs Less To Produce

SMALL MOTOR COMMUTATORS made by the Spring Division of the Borg Warner Corp., Bellwood, Ill., from Revere OFHC (Oxygen-Free High Conductivity) copper, exploded to show method of construction. After copper shell was stamped and formed on multi-slide machine and plastic molding material injected into it longitudinal slats were sawed just deep enough to completely penetrate the thickness of copper and thus form the segments, each of which are insulated electrically from one another and anchored firmly in the plastic.

IT was quite a complex problem the Spring Division of Borg Warner Corp. dropped into the lap of Revere's Technical Advisory Service. They were getting set to manufacture commutators for small motors and they wanted to select the best material for the job.

Here were the specifications: The material had to be the hardest possible yet still able to take the extremely severe forming operation which was to be done in a multi-slide machine. High hardness was necessary in order to combine maximum wear resistance with the ability to withstand the extreme centrifugal force developed in small motors operating at high speeds. In addition, in the molding operation, which is done after the copper shells have been formed, it was necessary to hold the diameter of the shell to within .001" in order to prevent the plastic from flowing between the mold and the outer surfaces of the commutator. An equal tolerance was also imposed upon the height of the solid cylindrical portion for the same reason. Also of great importance was the need for the cylinder wall being almost absolutely flat.

Because of long experience with somewhat similar problems Revere recommended trial of OFHC (Oxygen-Free High Conductivity) copper, four numbers hard. This was tested along with several other metals. The OFHC alone was found to produce excellent parts, and with tolerances so close as to be almost unbelievable in this type of operation. All other types of copper failed at the very sharp bend where the anchoring lugs join the side of the shell.

An unusual feature of these commutators is the plastic material used in the core. Tough, and unusual in composition, it serves both as insulation and as a mechanical connection between commutator and shaft without use of a bushing and key.

To determine if these commutators could *really* take it, test motors in which they were used were speeded up to 35,000 rpm. Although the wiring in the rotors practically exploded at that speed, there were no failures in the commutators, Temperature tests up to 400° F. were also made. Here again there was no damage to the commutator, though the rotor wiring was badly damaged due to the combination of centrifugal force and decrease in wire strength. Once again the unusual combination of properties of Revere OFHC copper had played a part in helping another one of the country's leading manufacturers produce an outstanding product at less cost.

Perhaps this or some other Revere Metal can be of help in improving your product—cutting your production costs. Toward that end we suggest that you get in touch with your nearest Revere Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.
Sales Offices in Principal Cities, Distributors Everywhere.

TABLE II

VISUAL OBSERVATION OF CHEMICALLY TREATED ALUMINUM

Alloy Treated	Phosphoric Acid-Water	Phosphoric Acid-Water-Acetic Acid	Phosphoric Acid-Water-Nitric Acid	Phosphoric Acid-Water-Acetic Acid-Nitric Acid
2S 1/2H	Brightening to some polishing in 3 minutes	Slight brightening in 3 minutes	Brightening to polishing in 3 minutes	Brightening to polishing in 3 minutes
24 ST3	Etched throughout 3 minute cycle	Brightened in 15 seconds but etched thereafter to 3 minute time	Brightened for 30 seconds but uneven attack with milky deposit for 1 to 3 minute cycles	Brightening changing to polishing in 3 minute range
52S 1/2H	Etched throughout 3 minute cycle	Brightened at 15 seconds and etched thereafter to 3 minutes	Brightening to polishing in 3 minutes	Brightening to polishing in 3 minutes

(Tests conducted in Enthone Co. Laboratories)

good exhaust ventilation must be provided. Depending on the temperature of operation of the bath, parts may be supported on racks, or basket handling methods may be used.

Characteristics of Polished Surfaces—Color appearance of a properly chemically polished aluminum surface resembles that of a bright chromium plate, as is illustrated by the treated parts shown in Fig. 3. Physical appearance, however, may vary widely depending on the original conditions of the surface, the alloy, and the operating conditions used in the treatment. Chemical polishing occurs with the dissolution of aluminum ranging from 0.0002 to 0.001-inch of surface thickness. Thus, such methods of treatment do not flow the metal as in mechanical polishing; as a result, deep mechanical abrasions are not removed.

These characteristics suggest one application of the process, namely, in finishing procedures where the cost picture allows prior work. Mechanical buffing is used for the first operation, thereby eliminating all deep scratches and imperfections, and the chemical polishing follows for the finishing step, leaving the surface with a clear brilliance. However, where a finishing procedure is desired, either because of cost considerations or because of unusual contours, making buffing impossible in many instances, it has been found[1] that a chemical polishing process will give a very attractive surface on the regular mill finished material.

Since the resistance to corrosion of the highly finished aluminum parts leaving the chemical polishing bath is about the same as the original stock, very little passivity being imparted by the treatment, it may be in order to consider subsequent methods of treatment which will add to the corrosion resistance of the articles. Following the brightening treatment, the parts may be rinsed thoroughly and anodized. Shorter anodizing cycles than are normal may be used to give corrosion resistance and yet not hide the brilliance of the original finish. The anodized part may be sealed and used as is, or it may be dyed to give extremely rich color effects.

A second method of finishing the highly polished surface is based on the use of organic films. A temporary coating of this type useful for cheap articles are so called water-shedding lacquers; in addition, their use assists in obtaining waterspot-free drying. However, a baked lacquer has been found to be much more durable and is generally considered for more expensive articles where provisions are made for drying and spraying.

Miscellaneous Chemical Treatments—Recent publications of Reynolds Metals Co.[3] have presented details on several processes for chemical treatment of aluminum surfaces, some of which may impart special properties.

Modified Bauer-Vogel Process—It has been reported that this process is of considerable commercial importance in the foreign field for the production of a protective oxide film on aluminum and aluminum alloys free of copper. The treatment involves immersion of the work in an aqueous solution of 5 per cent sodium carbonate and 1.5 per cent sodium chromate at 195-212° F for 3-5 minutes, then rinsing in water. The surface film formed (reportedly a slate gray in color) has been described as possessing fair adhesion and abrasion resistance. This treatment has been used as a base for painting and coloring. The hardness and corrosion resistance of the film can be increased by immersion in a 3-5 per cent sodium silicate solution, at about 195° F for 15 minutes.

Protal Process — This treatment consists of immersing aluminum for about 40 minutes in boiling solution of 0.5 per cent alkali manganate, molybdate or vanadate, and 1 per cent sodium hydroxide or carbonate. It is reported that the alkaline solution produces metallic compounds which form two oxides, a higher one which is soluble in alkali, and a lower insoluble. This occurs under the reducing action of hydrogen liberated at the aluminum surface. The lower oxide is deposited in the aluminum oxide film, forming what is described as an adherent protective oxide film on the metal.

Pacz Process—This process claims the treatment of aluminum in a hot (160-212° F) solution consisting of about 0.15 per cent sodium fluosilicate, sodium oxalate, or sodium fluozirconate, 0.25 per cent nickel or cobalt salts, 0.3 per cent sodium or ammonium nitrate, to yield a protective, colored, abrasion-resistant film. The variation in color tone in certain areas is said to result from the weak etching action of the sodium fluosilicate, etc., which dissolves aluminum. Darker areas result from the aluminum alloy constituents, such as iron or silicon, which are not attacked.

McCullock Process—A white protective film is said to be formed on commercially pure aluminum, or a greenish-white film is formed on aluminum alloys, by immersion in a hot (160-212° F) solution of 1 per cent calcium hydroxide and 1 per cent calcium sulphate for about 1 hour. The calcium sulphate is used to reduce the alkalinity of the bath; it has been reported that corresponding strontium compounds produce films equally as good. After treatment in the solution, until the active evolution of hydrogen subsides, the metal is washed and heated to about 390° F. This reportedly evaporates the water present in the film which is said to be composed of calcium and aluminum sulphate and aluminum oxide, and increases its electrical resistance. One report states that if aluminum is treated in a hot bath of 0.5 per cent barium oxide and 0.5 per cent barium sulphate, uniform silvery-gray adherent and protective films are formed on the metal.

Chromatizing—This treatment involves the treatment of aluminum in chromic acid solution to form a very thin, inert aluminum oxide film on the metal surface which serves to promote paint adhesion. One bath that has been recommended is a 5-10 per cent solution of chromic acid maintained at a temperature of 140-150° F. Work is left in the solution for about 5 minutes, after which it is rinsed in cold water and dried.

Frosted Finish for Aluminum—Frosted finishes produced on aluminum by chemical treatments have an

WHAT IS THE EXTRA .002" COSTING YOU?

.002" is not much . . . less than the thickness of this sheet of paper.

. . . Yet a .002" oversize variation, common in commercial quality strip steel (standard thickness tolerance, .020" thick: plus or minus .002"; standard crown tolerance, over 12" wide: plus .002") adds 1⅓ ounces to the weight of a square foot of .020" strip, increasing the weight from 13⅓ ounces to 14⅔ ounces.

This means you lose 219 square feet on every ton of .020" strip steel which runs a permissible .002" oversize.

. . . The wear on fabricating dies sized to handle .020" strip is obvious. Often the number of units produced per die grind is reduced 15% or more.

You can avoid much of this loss by using CMP THINSTEEL. With a plus or minus thickness tolerance often ½ or less of commercial tolerances, "yield" per ton can be increased as much as 10% or more while tool life increases of 10% to 15% are common.

In addition, you can reduce machine shutdown and change-over time by ordering CMP THINSTEEL in extra-long coils—up to 300 pounds per inch of width.

Why not let a CMP representative show you how much you can save by using THINSTEEL.

You can have cost-cutting

CMP THINSTEEL

in these grades and sizes

LOW CARBON—Four rolled tempers or dead soft annealed. Regular #2 finish or #3 bright for plating plus electro zinc coated for corrosion resistance. Cold rolled strip steel .001" and heavier, up to 24" wide.

SPRING STEEL—.25% to 1.35% maximum carbon. Four rolled tempers or spheroidized annealed plus hardened and tempered grades in thin sizes. All finishes, spring steel .001" and heavier.

STAINLESS STEEL—All popular types and finishes plus the CMP exclusive bright annealed chrome-nickel grades in thicknesses from .001" up. High tensile grades are a particular CMP stainless strip speciality.

PRECISION COLD ROLLED CMP STRIP STEEL

the **Cold Metal Products co.**

YOUNGSTOWN 1, OHIO

NEW YORK • CHICAGO • DETROIT • ST. LOUIS • INDIANAPOLIS • LOS ANGELES

attractive silvery appearance much like that of finely etched glass. The method is useful for finishing small or intricately shaped articles not adapted to machine methods. However, in many instances subsequent finishing treatments are required to make the finish more permanent.

According to recommendations[5] of Aluminum Co. of America, the first step in the frosting of aluminum is to etch in a hot caustic soda solution. This operation may be carried out in a wide range of conditions depending on the gage of the metal and the finish required. Immersion for 1 minute in a 15 per cent sodium hydroxide solution at 160-180° F is frequently used, although the concentration may vary from 2-25 per cent, and the bath is sometimes heated to boiling. It has been reported that the etching process is greatly accelerated at the boiling temperature, but the caustic may dry in streaks, causing stains.

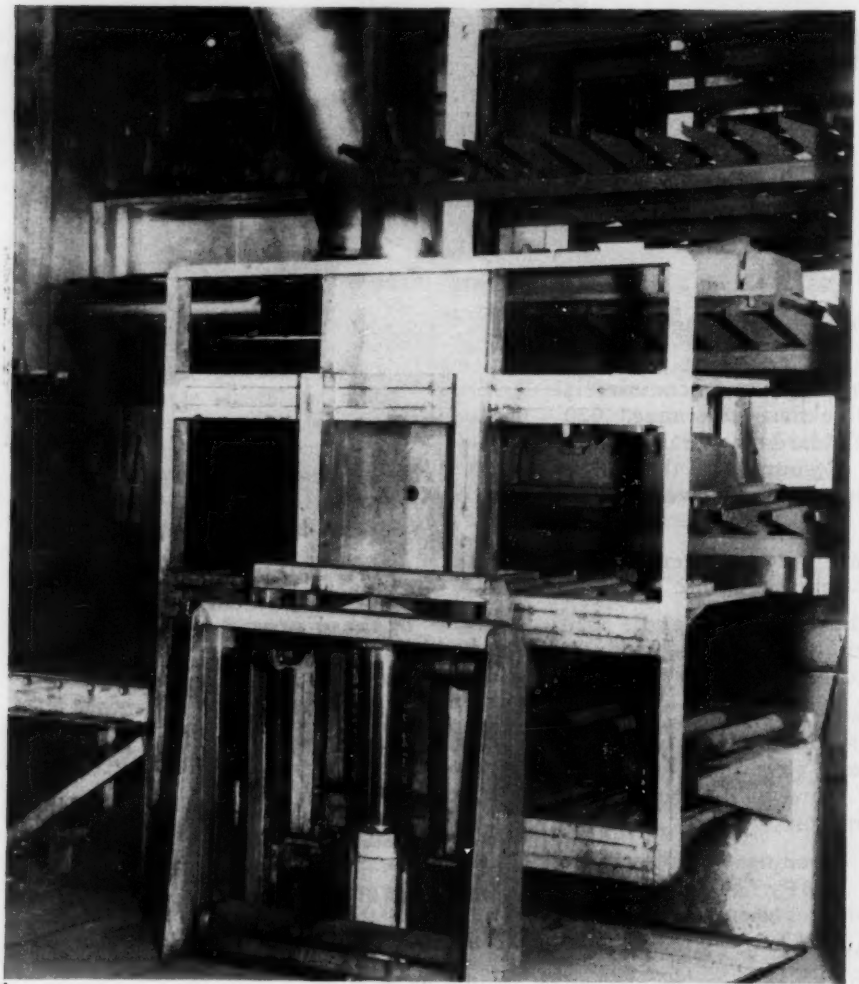
To overcome this difficulty some manufacturers use a 5 per cent caustic soda solution, followed immediately by immersion in a 2 per cent solution. The second solution is too weak to attack the surface of the aluminum in a short time, and therefore eliminates to some degree the problem of staining. If the time between etching and rinsing is kept at a minimum, the danger of staining is minimized. Also, there is less risk of discoloration when cold water instead of hot water is used for rinsing.

Third step in the process is to immerse in strong nitric acid to neutralize any sodium hydroxide left on the surface. A solution that has been recommended is made by mixing one to two parts of concentrated nitric acid with one part of water. This part of the process removes the colored film left on the surface by the caustic solution and leaves the metal with a clean frosted finish. Following this, the parts are rinsed in clear, cold water and finally dried.

When aluminum alloys which contain substantial amounts of silicon are to be frosted, it is necessary to add hydrofluoric acid to the nitric acid. One part of concentrated hydrofluoric acid to four-eight parts of concentrated nitric acid is a proportion that has been successfully used. It is important that this acid mixture be used cold; if it becomes hot during use, a yellow coating may be produced that is difficult to remove.

REFERENCES

1. Meyer & Brown, "Cleaning, Etching, Chemical Polishing & Brightening of Aluminum", paper presented before the 36th annual convention, American Electroplaters' Society (1949)
2. Gibson & Russell, *Ind. Eng. Chem.* 38, 1222 (1946)
3. "Finishes For Aluminum"—Published by Reynolds Metals Co., (1947)
4. Douty & Spruance, "Amorphous Phosphate Coatings For Protection of Aluminum Alloys and Paint Adhesion", paper presented before the 36th annual convention, American Electroplaters' Society, (1949)
5. "Finishes For Alcoa Aluminum", Aluminum Co. of America (1946); Also, Petit, *Products Engineering* p. 113, Nov. 1946.



GIVES CORES A LIFT: A 50 per cent increase in production is a result of installation of a hydraulic lift for transferring cores to and from oven conveyor racks in the Charles City, Iowa foundry of Oliver Corp. It is used in conjunction with two conveyorized core baking ovens with insulated cooling chambers, made by Despatch Oven Co., Minneapolis. Loader lifts and deposits three separate loads from the roller conveyor onto the three levels of the oven rack. Unloading is performed in a similar manner at the end of the oven cooling zone, the cores not being handled until the assembly operation.

Shows Packaged Grinding System

COMPLETELY self-contained and portable, a packaged dry grinding system made by Hardinge Co. Inc., York, Pa., needs but a single power connection to be put into operation. Unit will be exhibited at the 22nd Exposition of Chemical Industries, in New York, Nov. 28 to December 3.

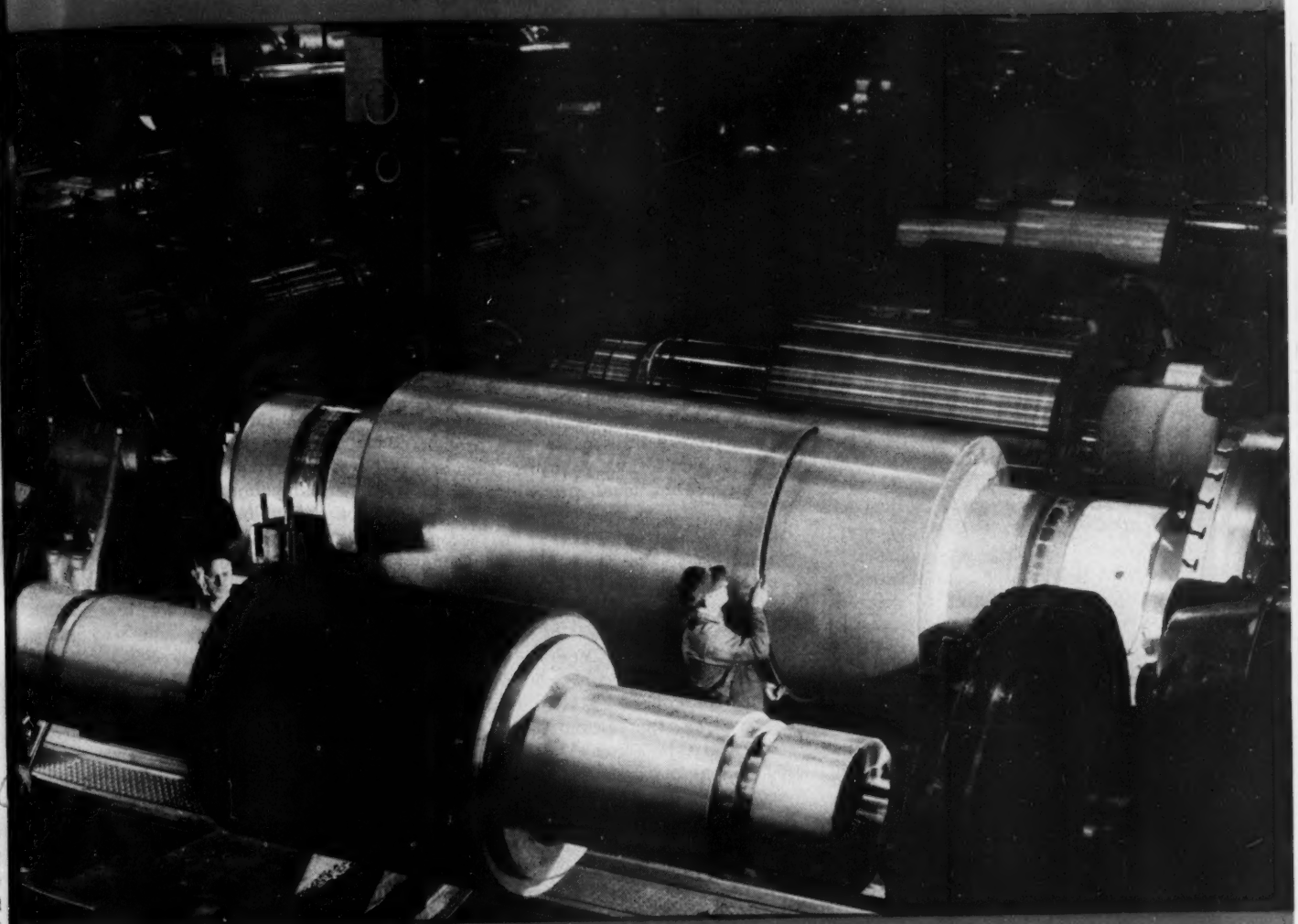
Measuring 5 x 7½ feet and 8 feet high, the packaged system includes a constant-weight feeder suspended from a 3 cu ft feed bin, a conical mill with drive motor, air classifying system with loop classifier, cyclone product collector, exhaust fan and piping, bag-type duct collector and "electric ear" sound control unit.

Metal Finishing Guide Offered

INCLUDED in the 18th annual edition of the *Metal Finishing* guidebook-directory are articles on various phases of such subjects as finishing plant engineering, abrasive methods, cleaning, pickling and electropolishing, plating solutions, surface treatments and control and testing.

In addition to the more than 70 articles there are sections devoted to first aid procedures, a directory by product classifications, a list of trade names and list of consultants, schools teaching electroplating, engineering societies and reference books. Publisher is Finishing Publications Inc., New York.

MESTA ROLLS



A section in one of the Mesta Roll Shops

Mesta produces all sizes of iron and steel rolls including the largest used in industry today. Efficient plant equipment, skilled workmen with long service records, an engineering staff whose technical ability has been accumulated over many years—these resources are responsible for Mesta's leadership in the production of the finest in rolls and other rolling mill equipment.

DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

MESTA MACHINE COMPANY · PITTSBURGH, PA.

HOBBING CAVITIES IN ALLOY STEELS

Long-running, trouble-free cavities for molding plastics can be produced economically by hobbing techniques

By JOHN SEKOWSKI
Midland Die & Engraving Co.
Chicago

FAST, economical method of forming molds for plastics consists of pressing a hardened steel master hob into an annealed steel blank. The master hob is an exact duplicate of the part to be produced in the die or mold. The hobbing industry has come a long way in the last 15 to 20 years. Years ago, the plastics industry was limited to very small parts such as radio knobs and small electrical parts. As molded parts became larger, naturally the capacity of hobbing presses had to be increased also. Today, 3000-ton presses are common all through the hobbing industry. One press in the plastics industry has a capacity of 8000 tons.

About 15 to 20 years ago when hobbing was in its infancy, a press of 500 tons capacity was considered large and the size of hobbed cavities in those days was limited to approximately 8 square inches. Steel used in hobbed cavities was a plain Swedish iron of the carbon 0.05, manganese 0.15 type. This hobbing steel when carburized had no core hardness to speak of; there were many cavity failures in the compression molding field.

Retainer Rings—In the hobbing of steel hobbed cavities, a retainer ring is necessary to confine the metal as the hob is pushed into the blank. These retainer rings are made of heat treated tool steel and are designed to withstand great pressures. With the coming of the larger presses and increased capacities, it became necessary to design larger and stronger rings to hold the blanks.

Retainer rings are made in various sizes and shapes; round blanks require rings in ½-inch sizes up to 6 inches; over 6-inch blank sizes increase by the inch up to 10 inches. Blanks measuring 10 to 22 inches are special and must be made to order. For rectangular blanks a large rectangular ring and spacers are used to confine the various size blanks. The openings in the retainer rings are made with an angle on all sides to facilitate the easy ejection of the blank after the hobbing operation is completed.

Taper on the side walls is also used for closing hobbed cavities. Although these rings are made with very heavy walls and are as strong as it is possible to make them, on occasions they will break in hobbing. When this happens one would think a bomb had exploded.

For this reason all hobbing presses should be well protected with armor plate, because one of these particles flying from a broken hob or a broken ring could seriously injure the operator. The usual procedure is to have a safety glass peek-hole in the armor plate doors. This helps the operator to do a better job because he can see the progress being made by the hob as it sinks into the hobbed cavity.

Steel for Hobs—Years ago, when plain Swedish iron was used exclusively for hobbed cavities, tool steels known as the chrome manganese tungsten type (carbon 0.9, chromium 0.5, manganese 1.15, tungsten 0.5) were used for hobs. Here again hob steels presented a problem similar to the one just discussed on the rings, because the capacities of hobbing presses have been increased and tougher alloy steels are now used in hobbing. This forced the hobbing industry to develop tougher steels for hobs. Hob steels of today must be able to withstand as high as 150 tons per square inch of pressure. The steel most commonly used in hobs today is known as a chrome silicon manganese type with 2.5 per cent tungsten. This is a chisel type of steel and has proved very satisfactory. For large hobs that require greater pressures, the high speed type of steel is usually used.

In the construction of hobs, the toolmaker must be sure he has the proper drafts on all hobbing surfaces. Above all, he must be careful to avoid thin sections, unbalanced sections, and sharp corners on hobs to be used in the hobbing of alloy steel. If at all possible, corners on hobs should have at least a 0.010-inch radius. Draft on the side walls of hobs are quite necessary because if this draft is not present, the hob will have a tendency to tear as it is going down into the blank. Another reason for the draft on the side walls of a hob is so that it can be fitted into the cavity after annealing for subsequent pushes. Many hobs have been broken in the process of pulling them out of the cavities.

This is usually due to undercuts or backdraft on the side walls of the hobs; therefore, the toolmaker should be very careful to avoid these errors in making hobs. Thin sections on hobs should be avoided at all times. It is usually more economical to machine or engrave thin slots in cavities than to try to hob them. This may result in a broken hob and getting into a lot of trouble one way or the other.

Unbalanced sections on hobs, such as an angle on one side and a straight wall on the opposite side, will give a hobber no end of headaches as the hob goes down into the cavity blank. Angles will force the hob over to one side and if there are any projections or indentations of any kind on the face of the hob, for instance, lines or letters, they will be torn in the hobbing process. Sometimes an unbalanced condition can be remedied by building a double cavity hob. In this way a balanced condition instead of an unbalanced one will prevail.

Regardless of how careful a toolmaker is in making the hob, unless it has the proper hardening and drawing, the hob will be useless.

Hob Breakage — Because of the toughness of alloy hobbing steel, the hobber experiences more hob breakage. Replacing hobs has become an expensive item in the cost of hobbing, so like other toolmakers, the hobber has turned to the toolmaker's friend, the welder. Welding of hobs has proved quite satisfactory. Sections that occasionally break off are welded on, saving the time and expense of making a new hob.

In hobbing alloy steel, all the pitfalls that have been mentioned must

From data presented by the author before the 1949 conference, Society of the Plastics Industry, Chicago.

be especially avoided because the tougher the hobbing steel the tougher time a hobber has in making a good cavity. The alloy steel most commonly used in the plastic industry today has the following analysis: Carbon 0.08, chrome 1.4, nickel 0.5, molybdenum 0.25 per cent. This type of steel has proved very successful in all types of plastic molding; injection, compression, and transfer. When carburized it has a surface hardness of 60 Rockwell C and it takes a very high polish. In a 3-inch cavity cross section Rockwell C reading in the core will be 10 to 20. This is very tough stuff as compared to the zero reading of the old Swedish iron type of hobbing steel.

More Frequent Annealing—In making test hobbings, the differences in depths with similar tons of pressure have been checked, using the same hob size blanks on both types of steel. With the old type of Swedish iron a depth of 1¼ inches was attained, while in this new alloy hobbing steel, the same hob penetrated only ¾-inch. Hobbing in the alloy types of steel requires annealing more times than were used in the hobbing of plain iron, but very few jobs are impossible to hob in an alloy steel when the proper annealing precedures are used.

There was a time when most molders would frown on the use of hobbed cavities for molding high impact or semi-impact materials. Of course, this is all by the board today, because with these alloy hobbing steels there have been many long runs made with high impact materials. The injunction molders have also had some cavity failures with the plain hobbing steel. However, with the use of alloy hobbing steels in the injection field, one hardly hears of cavity failures today.

Air Hardening Steel—Latest addition to the hobbing steel family is an alloy steel of the air hardening type. This steel contains carbon 0.10, chrome 5, silicon 0.20, molybdenum 0.90, manganese 0.30, vanadium 0.35. One can see from this analysis it is a very tough steel. As a comparison between the hobbability of this air hardening steel and the alloy hobbing steel referred to previously, the air hardening steel cavity after being subjected to the same pressure attained a depth of only ¼ to ⅜-inch. This clearly demonstrates that the hobber will be forced to anneal the air hardening steel cavity three times to achieve the same result that can be attained in one annealing process using the alloy hobbing steel.

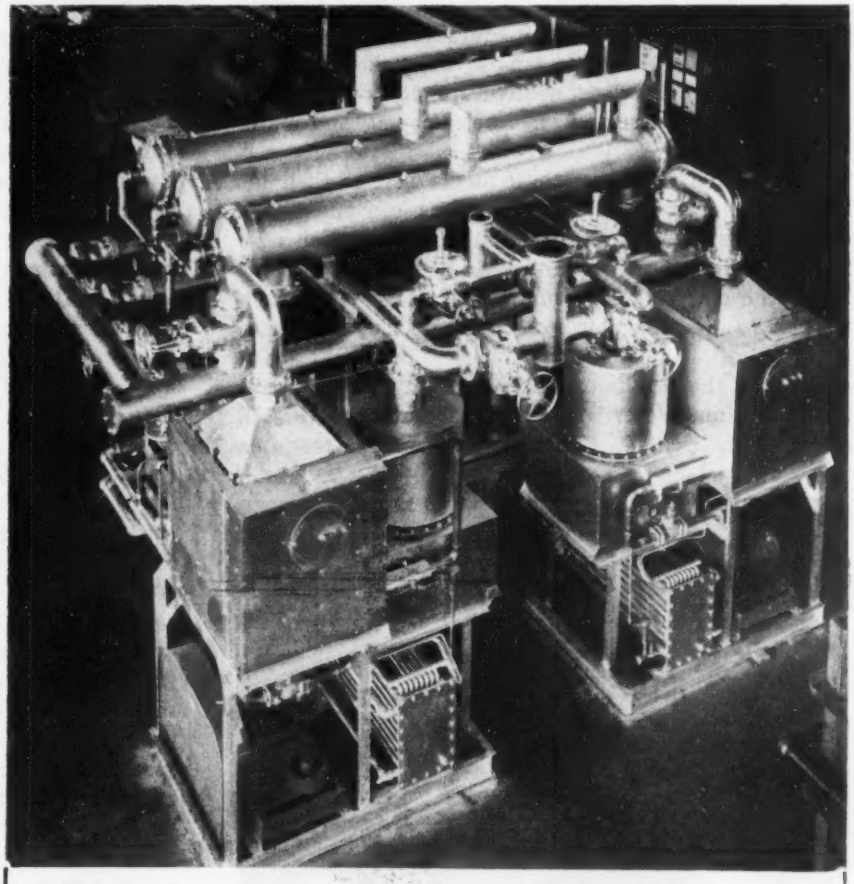
This type of steel has worked out very satisfactorily for long-running plastic jobs and also for zinc die casting dies, since it has a lot of resistance to heat, holding its physical properties at operating temperatures of 800° F. If this air hardening steel is pack hardened, it will give a surface hardness of 60-64 rockwell C and a core hardness of 35 to 38 rockwell C. Cavities made of this steel compare favorably with tool steel cavities.

Without a doubt, the thing in which we are all most interested, is cost. The moldmaker always wants to know the cost per cavity, also what the increase in the cost of hobbed cavities will be with the use of alloy steel. The molder, however, is interested in the cavity cost per unit of molded part. In answer to the moldmaker's question, alloy steels have increased the cost of hobbed cavities. However, considering the toolmaker's wages today, cost of machining multiple cavity molds is prohibitive. When a cavity lends itself, hobbing is still the most economical way to make it, whether it will be made in regular hobbing steel for shorter runs or in alloy hobbing steels for longer runs or in high impact materials.

Threads 1500 Pieces per Hour

TWELVE spindles provided with lead screw feed and carrying die heads, six on each end, make possible continuous threading from both ends of suspension arms on a double-end horizontal threading machine. Made by Davis & Thompson Co., Milwaukee, Wis., the machine maintains continuity of thread by lead screw bushings always being in the same relation.

Work piece loading is done by the operator at an open station while the machine is in operation. As it progresses through its cycle, work pieces are held by equalizing jaws in the fixture through a chain clamping arrangement. When threading operation is complete, die heads are opened by an outside contact ring, lead screw is released, spindle returned to starting position, fixtures automatically unclamped and work rolled into a discharge chute. Production of this piece is at the rate of 1060 pieces per hour but 1500 pieces may be produced, depending upon type of workpiece, material characteristics.



LARGEST UNIT: To be used for the clean annealing of sheets in box annealers in the strip sheet mill of Jones & Laughlin Steel Corp., Pittsburgh, is this DX atmosphere generating unit. The largest ever produced by Surface Combustion Corp., Toledo, O., it employs the partial combustion of natural gas and has a capacity of 35,000 cu ft of DX gas per hour

FUNDAMENTALS of STEELMAKING

NUMBER 15 OF SERIES

Another in a continuing series of articles on the making of steel and finishing it into products ready for the consumer. Each article is written by an outstanding authority in his particular field.

Production of STAINLESS STEEL

Stainless steels as we know them today appear to have originated from experiments of Harry Brearley of Sheffield, England. While trying to develop a more erosion resistant iron-base gun lining, he accidentally noticed that some specimens failed to rust, thus discovering stainless steel

By B. H. DeLONG
Vice President and Technical Director
Carpenter Steel Co.
Reading, Pa.

PART I

STAINLESS steels, with a few exceptions represent a group of about thirty steel alloys, each containing over 11.5 per cent chromium with or without other alloy additions, notably nickel and molybdenum. These steels find many applications because of their versatility, strength, durability and beauty, and have opened new horizons in the fields of transportation, food handling, achitecture, chemistry, automotive and petroleum production, dairying and many others.

Twenty-five years ago these steels were in their infancy; however, since that time their use and development has increased tremendously. Production rose from 42,000 tons in 1929 to over 500,000 tons in 1947. From the demands of industry there is every reason to believe that further important developments are to come.

Some of the results of Harry Brearley's epoch making work are described in U. S. Patent 1,197,256 dated Sept. 5, 1916. Claim 4 of his patent reads as follows: "A hardened and polished article of manufacture composed of a ferrous alloy containing approximately C—0.30 per cent, Mn—0.30 per cent, and Cr—13.0 per cent."

Not only is this patent historical because of its content but it should remain as a classic example of literary brevity. It contains only 90 lines. It is interesting to record that at the time of his discovery Brearley was trying to develop a more erosion resistant iron-base gun lining and not a stainless steel. During the course of his work he observed that some of his specimens, after being stored away for a long time, did not show any signs of rust which was really most unusual considering the damp English climate. It did not take long then to realize that it was possible to convert the reliable servant "iron" to a noble state capable of ruling over many dominions formerly trusted only to more expensive metals such as nickel alloys or silver.

One of the characteristics of Brearley's 0.30 per cent carbon, 13.0 per cent chromium steel is that it must be hardened by heat treatment before it becomes truly stainless. This restriction is due to the fact that the steel contains 0.30 per cent carbon. It is perhaps not of Brearley's choosing that the carbon content was so high but rather that the raw materials and melting practices of the time conspired to dictate the minimum percentage allowable. With development of relatively inexpensive low carbon ferrochrome it gradually became possible to melt heats of steel in the arc furnace with 0.10 per cent carbon maximum. At this low carbon content it is no longer necessary to harden the steel to obtain stainless properties. The lower carbon stainless steel also has much better formability and because it is inexpensive, is used in many applications.

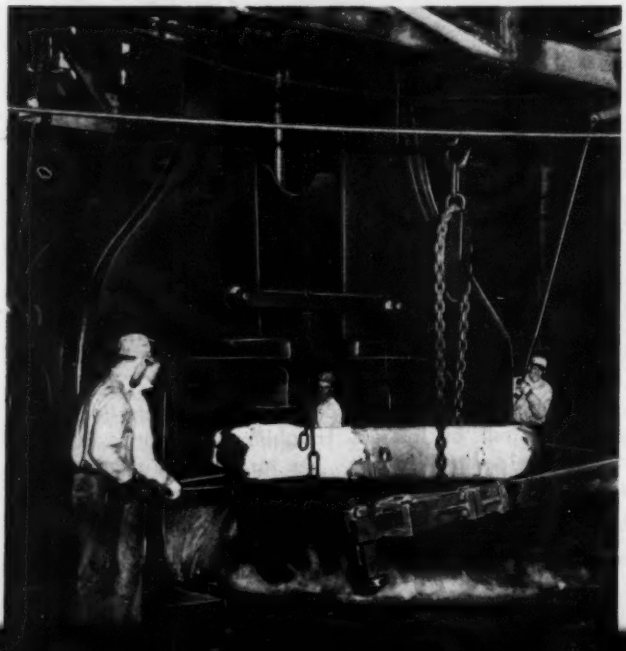
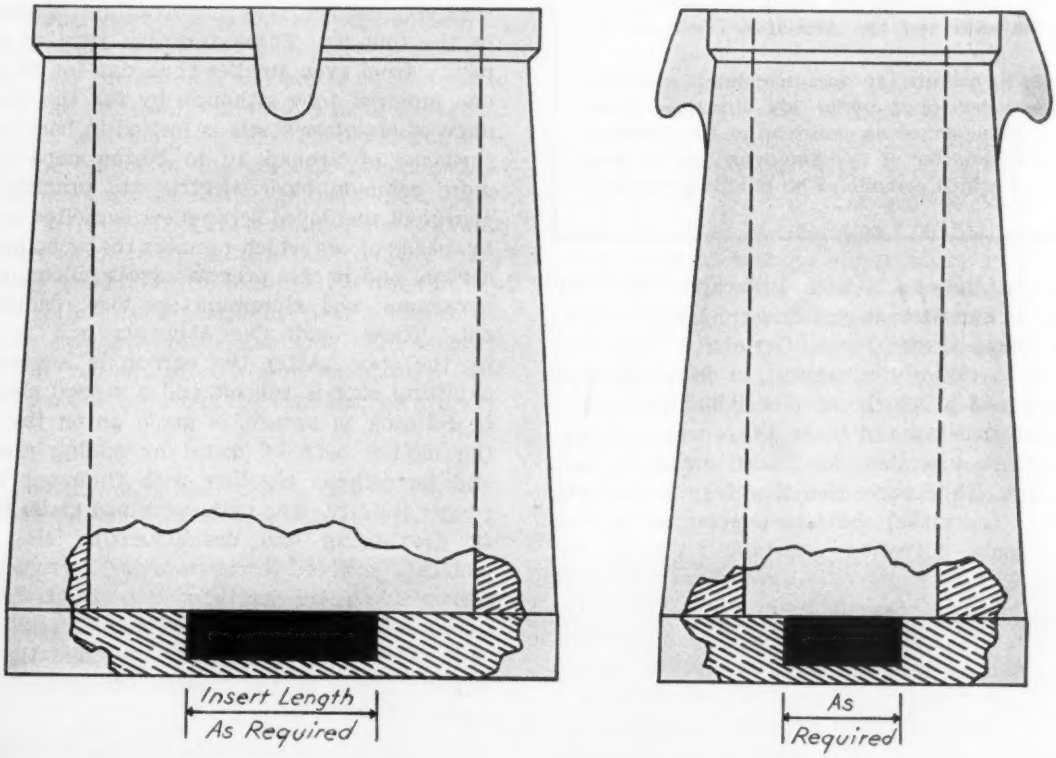


Fig. 1—Hammer cogging a 12-inch stainless steel ingot on a 7-ton hammer

NO MORE STICKERS!

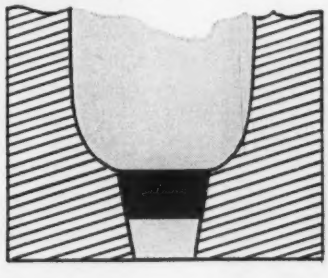
...when you use "NATIONAL" graphite stool inserts!



Use "National" graphite stool inserts in your open-bottom molds and you *eliminate stickers completely and forever!* Other advantages of graphite stool inserts are:

- They increase stool life by a wide margin
- Fewer stools are required — lower foundry costs
- They resist erosive action of falling molten metal

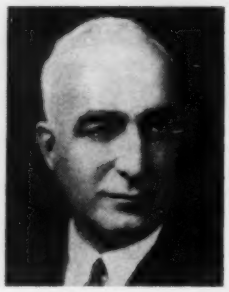
For more information on "National" graphite stool inserts, write to National Carbon Company, Inc., Dept. S.



The term "National" is a registered trade-mark of
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
Division Sales Offices:
Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

If you use plug-bottom molds, "National" carbon mold plugs save dollars. They last longer . . . weigh less . . . are truer to shape . . . won't stick, spall, or contaminate the ingot. Write us for complete details.

THESE PRODUCTS SOLD IN CANADA BY CANADIAN NATIONAL CARBON COMPANY LTD., TORONTO 4, CANADA



The author received his A. B. degree in chemistry from Cornell University in 1909. For a year following graduation he was employed as a chemist at the Stanley Works, New Britain, Conn. In the latter part of 1910, he became associated with Carpenter Steel Co., as assistant to the metallurgist. In 1915 he was appointed metallurgist and in 1941 became chief metallurgist in charge of the research department. Four years later, he was appointed vice president and technical director as well as a director of the corporation, which positions he holds today.

His technical connections include membership in the American Iron & Steel Institute, Iron & Steel Institute of Great Britain, American Association for the Advancement of Science, American Society for Testing Material and the American Chemical Society.

The basic patents of free-machining stainless steels were developed under his direction. From 1942 to 1948 he served as chairman of the Stainless Technical Committee of the American Iron & Steel Institute, of which committee he is still a member.

Perhaps simultaneously with Brearley's discovery was that of Benno Strauss and Edward Maurer working at the Krupp works, Essen, Germany. These two scientists were initially interested in heat resistant metals composed primarily of nickel and chromium. The corrosion resistance of these alloys was early appreciated but so was their high cost, owing to high nickel content. They proceeded therefore to find out how much of the nickel could be supplanted by iron and yet remain corrosion resistant although not necessarily heat resistant. The result was Krupp's V2A steel now so commonly known in this country as "18-8", since it contains 18 per cent chromium and 8 per cent nickel. Not only is it unnecessary to harden this steel for maximum corrosion resistance but it is incapable of being hardened by heat treatment.

High grade controlled scrap, ferroalloys, and other raw materials are necessary for making quality stainless steel. Melting conditions such as atmospheres, and slags, (oxidizing and reducing), together with temperature must be readily controlled and these stringent requirements make the electric arc furnace methods of melting mandatory excepting when high grade stainless scrap, free of impurities, is available in which case induction furnace melting is practiced.

Fig. 2—Rough turning a stainless steel round billet to remove surface defects

In the manufacture of stainless steel ingots, which are later to be rolled or hammered into commercial forms, the so-called "basic" arc furnace is most generally used. This furnace has a magnesite bottom permitting the use of highly basic lime slags for refining. In the manufacture of stainless steel castings, on the other hand, the "acid" furnace is quite universally used. In this furnace the bottom is made up of silica brick or sand, permitting the use of silicous slags which have the advantage of easy handling in the foundry. These furnaces vary in size or capacity from even smaller than one ton to as large as one hundred tons although by far the greatest tonnage of stainless steels is melted in basic electric arc furnaces of around 10 to 50-ton capacity. In the more common basic electric arc practice, the base charge of unalloyed scrap steel is melted and oxidized by means of ore which removes the principal impurity, carbon, and in this process excess silicon, manganese, chromium, and aluminum are also oxidized if present. These oxidizable elements will be taken up by the slag. After the carbon is low enough, the oxidizing slag is run off and a second slag, reducing or refining in nature, is made up on the surface of the molten bath of metal by adding crushed lime, and ferrosilicon together with fluorspar to promote proper fluidity. The bath is refined under this strongly deoxidizing and desulphurizing slag. Alloying elements such as ferrochromium, ferrocolumbium or ferromolybdenum are then added to the bath. A few of the alloying elements such as nickel are not readily oxidized or lost to the first slag and these are frequently added to the charge during the initial melt down.

Several special methods for the melting of stainless steel have been developed which permit the use of chrome ore and a large percentage of stainless scrap, to replace in large part the use of low carbon ferrochromium. Specially constructed arc furnaces, usually lined with chromite or chrome ore, are sometimes employed. In general these processes consist in melting down under highly oxidizing conditions a charge high in chromium content. Carbon is thus removed, but in so doing much of the chromium is oxidized into the slag, so that this must again be reduced into the bath by heavy additions of a deoxidizer, usually ferrosilicon. Necessary fluxing materials such as lime and spar must be added to produce a manageable slag. One of these special processes which has come into use recently consists in melting down a charge of stainless steel scrap, and at the proper time bubbling oxygen through the bath to boil out the carbon. When carbon has been removed, the chromium is reduced from the slag in the

manner already described. Recovery of about 80 to 90 per cent of chromium has been reported with this practice.

Procedure to be followed in melting stainless steel in the basic electric furnace will, as we see, vary considerably from plant to plant and of course from one kind of stainless to another. The following is a brief outline of one way, for example, that a 12-ton heat of chrome-nickel stainless may be melted. About 16,000 pounds of steel plate containing approximately 0.20 per cent carbon together with the desired amount of nickel in the form of electrolytic nickel plate and molybdenum in the form of ferromolybdenum is melted down under the arcs of three carbon or graphite electrodes. Approximately 800 pounds of iron ore (Fe_2O_3) is next added to oxidize carbon and form a boil resulting from the formation and evolution of carbon monoxide gas. A sample taken for analysis at this point shows the bath to contain about 0.02 per cent C, 0.05 per cent Mn, 0.10 per cent Si, 0.05 per cent Cr, and residuals plus added amounts of the not easily oxidizable metals, such as nickel, copper, and molybdenum. The oxidizing slag containing the oxides of the various metals is then run off. A new slag is made up from lime, fluorspar, and ferrosilicon. This reducing or refining slag removes much of the sulphur and reduces many of the oxides present in the bath. All of the chromium, approximately 6000 pounds, is next added in the form of low carbon-ferrochrome. The bath is again analyzed for carbon, silicon and manganese, and finally the heat is adjusted for tapping, both as regards temperature and analysis and tapped.

Fig. 3—Rolling stainless steel rounds on a 20-inch two-high mill

The high frequency induction furnace affords a convenient means of melting stainless steel from charges containing high percentages of stainless steel scrap, since in this process there are practically no alloy losses. It is for this reason that the raw material, namely scrap, must be free of harmful impurities. The process is primarily one of melting scrap, making necessary additions to meet desired analysis, adjusting pouring temperature, deoxidizing and then pouring. Although slags are not generally used in induction melting, there are numerous instances where special treatments and special slags are employed to improve properties of the material. In the induction furnace most generally used for

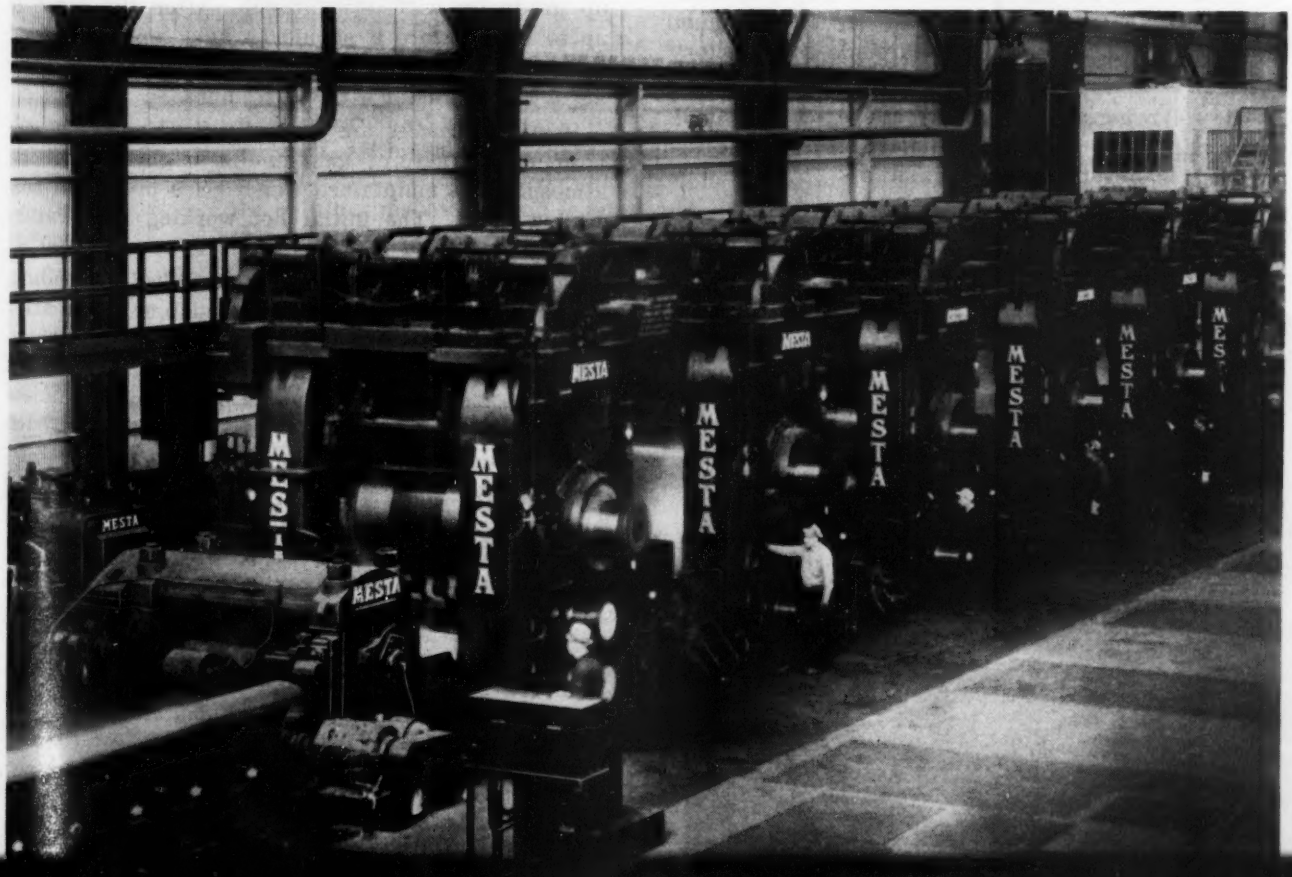


Fig. 4—Stainless strip and sheet is rolled on modern continuous hot mills such as this massive unit

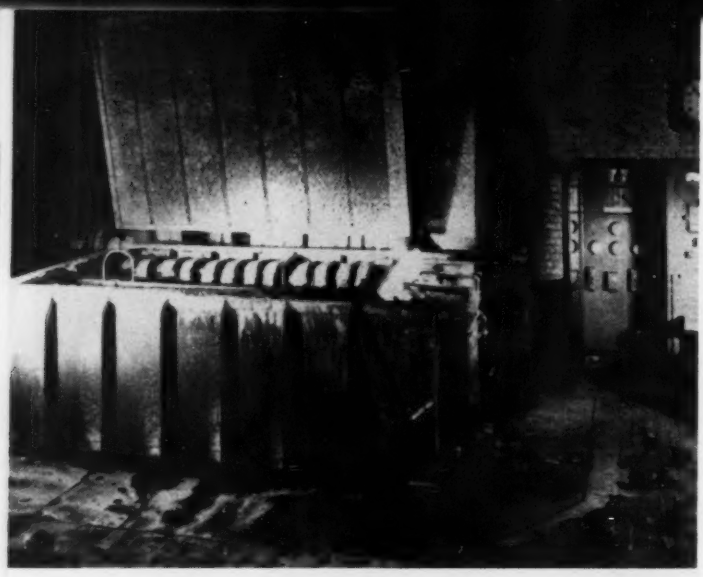


Fig. 5—Sodium hydride pickling bath and instrument control panel

melting, a frequency of about 980 cycles per second is employed. This frequency best meets the requirements for rapid heating throughout the charge. Furnaces range in capacity from a few hundred pounds up to several tons or even larger. The time required to melt depends on capacity of the electrical equipment, but 1 hour for a ½-ton melt in a 300 kilowatt furnace would be typical. One procedure that might be followed in melting a heat of chrome-nickel stainless steel would be as follows: Up to as much as 90 per cent of stainless scrap is added to the furnace. This may be either a chrome-nickel type or any other stainless which would fall within the desired analysis limits. After melt down, an adjustment to the analysis is made. Ferrosilicon is then added to deoxidize the metal before the addition of chromium in the form of low carbon-ferrochrome is made to the melt. Ferroalloys such as ferromolybdenum, ferrocolumbium, ferrosilicon, etc., as required by the analysis are added next, followed by deoxidization of the heat with calcium silicide or aluminum. Finally, the heat is poured through a refractory ceramic dish into the mold.

The following alloys and ferroalloys are commonly used in melting stainless steels; the balance of the analysis is, for the most part, iron:

Ferrochromium	70 per cent Chromium
Ferrocolumbium	56 per cent Columbium
Ferrotitanium	42 per cent Titanium
Ferroselenium	55 per cent Selenium
Ferromolybdenum	61 per cent Molybdenum
Ferrotungsten	80 per cent Tungsten
Cathode Nickel	99 per cent Nickel
Nickel Oxide	75 per cent Nickel
Iron Sulphide	35 per cent Sulphur
Nitrogen Ferrochromium	70 per cent Chromium
Electrolytic Copper	100 per cent Copper

Fig. 6—Drawing square stainless steel bar through die on drawing bench. Steel is drawn to produce accurate size, increased strength and desired shape and surface

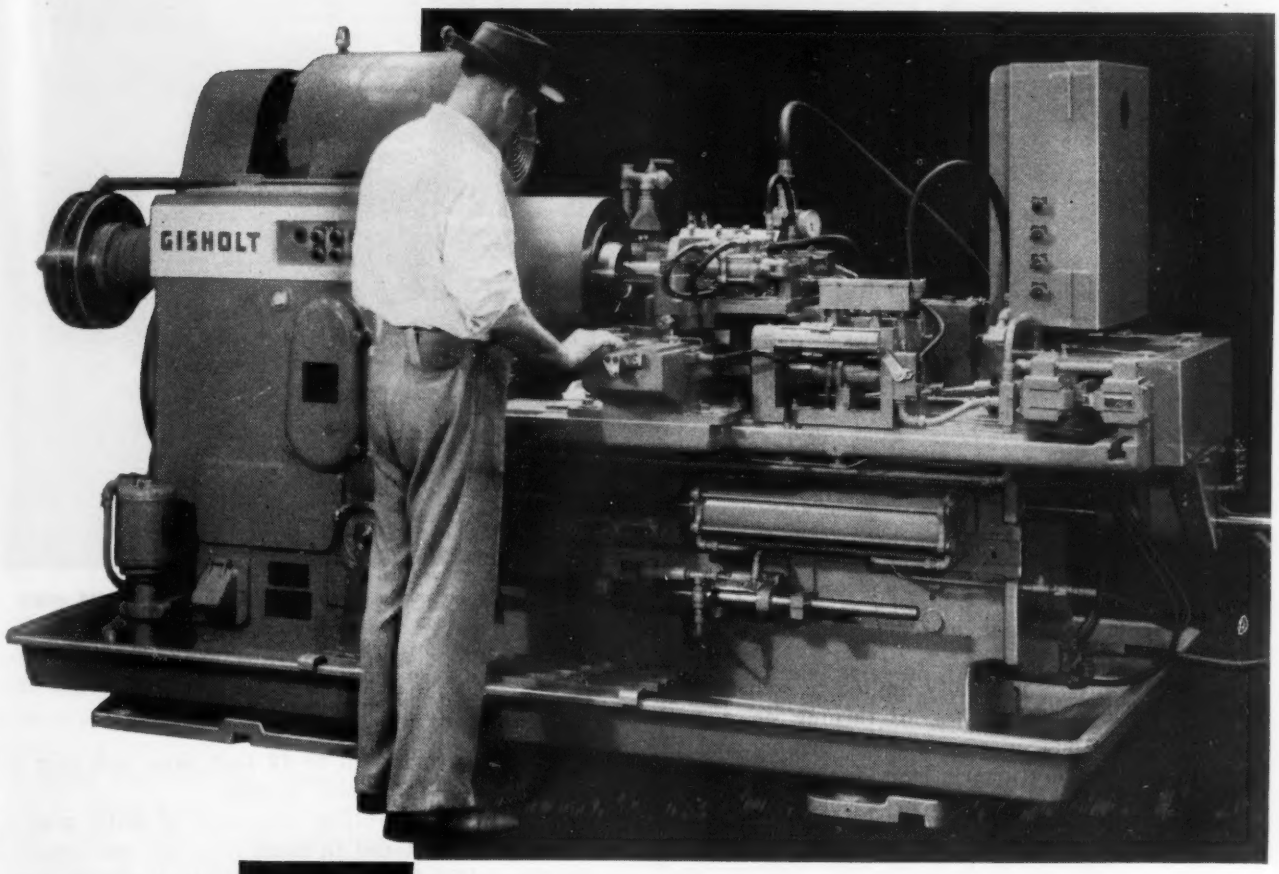
Usually the ingot sizes for stainless steels follow those conventionally used for other steels. Molds are of the big-end-up type on top of which is placed a brick refractory called the hot top which by keeping a reservoir of molten metal to feed the center of the ingot as it freezes, prevents shrinkage cavities. Ingots may be removed from the molds and placed in a soaking pit prior to hot working by rolling or hammering or they may be cooled to room temperature and then reheated prior to hot working. When soaking pits are used, control must be exercised over the temperature employed. If soaking pits are not used proper precautions are taken in cooling the ingots prior to reheating.

In heating ingots for cogging into billets, care must be exercised to prevent too great a temperature difference between the ingot's surface and center. Stainless ingots must be brought to temperature more slowly and allowed to stay at temperature longer because of their lower heat conductivity which is only about one third as great as for ordinary steel. If heated fast the outside of the ingot may become very hot and expand more rapidly than the inside with the result that the metal may tear apart forming a defect known as a "clink". These may be avoided by slow heating and by preheating. The exact procedure employed depends on the type of steel and size of ingots. When preheating is practiced the temperature recommended depends upon the individual composition. When preheating is not practical the ingot should be charged in a cold furnace, and brought up gradually with the furnace. After the ingot is up to temperature it should be held for a length of time depending upon size. The average time of holding a 10 inch ingot is about 5 hours.

Heating furnaces are generally fired with low sulphur oil or natural gas, and a slightly oxidizing atmosphere is maintained which helps produce a free scaling oxide. The initial hot working temperature for practically all stainless steels is around 2100° F.

Generally the ingots are first worked by rolling, hammering or pressing to a billet, slab or bloom after which they are prepared to produce a clean surface. Hammering of an ingot is shown in Fig. 1. The billets are rolled on conventional mills but because stainless steels are harder at red heat the reductions for each pass through the mill are smaller.

Stainless steels, especially, must have surfaces free of defects to improve appearance, decrease corrosion and increase strength. Several methods are used to prepare the billet surfaces prior to rolling to size.



HOW 8 SIMPLIMATICS *cut machine time 50% cut man-hours 75%*

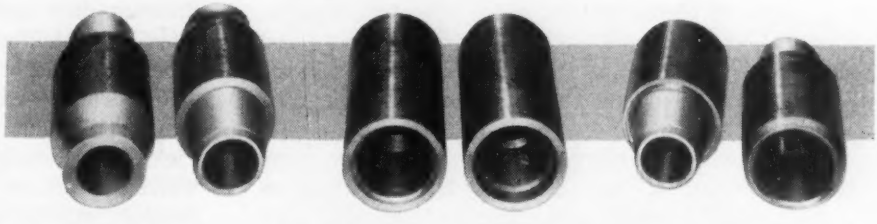
The way you can slash costs with the Gisholt Simplimatic often surprises some of the most experienced production men.

Here's a big shop which found that 8 Simplimatics could take over the job done on 16 other machines. And it takes only 4 operators instead of 16 to turn out the volume of parts required.

Not the least in the cost picture is the machine itself. For the basic Simplimatic design permits you to individualize the machine to a high degree to solve many different problems. Thus, for many jobs you can have all the advantages of a special machine merely with special tooling. Yet it's all done on a Standard Simplimatic—at far lower cost.

The importance of lower costs these days makes it important for you to get all the facts about Simplimatic Automatic Lathes.

The GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*



In producing these tool joint pins and boxes, the 8 Simplimatics work in pairs with fully automatic operation; one man can easily tend two machines.

Ask about the many different arrangements possible on the Standard Simplimatics with platen table, vertical head, etc.

GISHOLT MACHINE COMPANY, *Madison 10, Wisconsin*

TURRET LATHES • AUTOMATIC LATHES • BALANCERS • SUPERFINISHERS • SPECIAL MACHINES

Fig. 7—Drawing stainless steel into round wire. Material was previously hot rolled, cleaned and limed rod which first passed through grease or soap and then through die to be eventually coiled-up by mechanically driven block

Rough turning, chipping and grinding are the most common.

Rough turning is generally limited to round billets —the process being similar to turning on a lathe excepting that instead of the billet turning and the tool remaining stationary, the tools, usually six or eight in number mounted in a ring revolve about the perimeter of the billet. This process is shown in Fig. 2. Rough turning is the least demanding on human labor.

Grinding is best adapted to flat surfaces such as square billets. Surfaces may be ground all over or in spots depending on condition of the billets. Grinding wheels are on the average about 24 inches in diameter and turn about 1500 revolutions per minute. The wheel is swung back and forth from a frame by the operator.

Chipping is carried out using pneumatic chisels. Defects, such as seams, which are usually elongated are marked with a crayon and an operator then removes the defect such as chips of wood are gouged with a gouging tool.

Frequently several of the above methods are used in combination, such as "grind-pickle-and chip". The billet is first ground all over, then cleaned or pickled in hot acid to reveal any local defects too deep to be removed by the grinding and these defects are then chipped out. All surface preparation procedures are costly but indispensable to quality steels.

Stainless steels are, with few exceptions, furnished in the form of plates, sheets, strip, bars, tube rounds, structural and bar shapes, round and flat wire rod and tubing. In producing these products the prepared billets are reheated and rolled on conventional mills as shown in Figs. 3 and 4.

The following illustrates briefly the basic steps of one method of processing a 10-inch stainless ingot to 1-inch round bars. The method will vary with other types of steel.

Bloom down 10-inch ingot to billet approximately 4-inches square or round which is rough turned if round, or ground and chipped if square. Common practice is to first grind, then pickle to expose further defects and then chip. Cut billet to proper lengths to provide 10 to 14 feet bars, and then roll billets direct to 1-inch rounds.

Following hot rolling the steel if hard must be annealed or softened to place it in the best condition for the cold forming operations which consist mainly of drawing into wire or rolling into strip or sheet.

Methods of annealing vary widely. Generally the chrome-nickel types are quenched into water from a yellow heat, 1850 to 2100° F. This treatment not only softens but places the steel in the best condition to resist corrosion. Chromium stainless steels are annealed at a lower temperature, 1550 to 1650° F and are generally slow cooled in the furnace. Even lower temperatures, 1200 to 1400° F, are used on chromium steels if only requirement is to remove stresses and hardness imparted by cold working.

Complex oxides of chromium, iron and nickel, mainly, are formed on the surface of the steel during heating and hot rolling. This coating is known as "scale". Most heating scale falls off during hot rolling and this often has a beneficial effect in that surface defects and decarburized metal is scaled away. Scale which remains after hot rolling is completed must be removed if further cold reductions are to be made because it is very abrasive and would scratch drawing dies and rolls. Generally the oxide is removed by pickling, i.e., immersion in hot dilute hydrochloric acid or mixtures of nitric and hydrofluoric acids. These acids are more active than the warm dilute sulphuric acid used on most alloy steels. Pickling generally takes from 10 to 30 minutes after which all traces of acid are removed with a high pressure stream of water. The rod may or may not then be coated with lime and baked at about 250° F depending on the type of ensuing cold deformation. Baking serves two purposes—it dries the lime making it more adherent and drives off any hydrogen which may have been absorbed by the steel during its sojourn in the pickling bath because hydrogen tends

REPRINTS AVAILABLE

REPRINTS of this article in the series "Fundamentals of Steelmaking" and others published over the past few months may be obtained at nominal cost by addressing Readers' Service Department, STEEL, 1213 W. Third St., Cleveland 13, O. Other subjects covered include blast furnace, open hearth and electric furnace practice, tool steels, roll design, coke production, plates, sheets and strip, tin plate, structurals and rails, scrap, bessemer steel, butt and lap weld pipe and seamless tubing.

to embrittle certain steels. Pickling is necessary not only after completion of hot rolling but after each process anneal in which scale is formed.

Acid treatments are not used for cleaning alone—they are also used for brightening the surface to give a more pleasing appearance. In addition, stainless steels are frequently "passivated" or "immunized" by immersing in an oxidizing acid such as nitric. The molecularly thin film of oxide formed by this treatment improves corrosion resistance of the steel. The passivating treatment is the final acid treatment that the metal receives and consequently is also relied upon to dissolve any foreign particles of steel which might have clung to the stainless and would have decreased its corrosion resistance.

One of the newer and highly successful methods of descaling stainless steel is the sodium hydride process. This is performed using a molten bath of sodium hydroxide at about 700° F. At one end of the bath there is a compartment into which metallic blocks of sodium are introduced. Hydrogen from dissociated ammonia is then passed over the sodium and sodium hydride formed which is dissolved by the bath in this manner to the extent of 1.5 to 2.0 per cent sodium hydride. The sodium hydride reduces the scale by chemical reaction. The reduced scale or metal is so loosely held that it falls off when the steel is quenched from the hot caustic into cold water.

The bath and instrument control panel are shown in Fig. 5. After descaling by sodium hydride, stainless steels may be dipped briefly in dilute acids to brighten or passivate the surface.

Another process for treating the surface of stainless steels is known as electrolytic polishing. Here the stainless article is made the anode in a suitable acid solution and by passing current, a small amount of the stainless is dissolved and the surface becomes as bright as though it had been buffed. One of the most popular acid mixtures used as an electrolytic polishing solution is glycolic, phosphoric and sulphuric acids, used at approximately 8 volts and at 150° F for 2 minutes. Other popular solutions consist of citric-sulphuric acid or sulphuric-phosphoric acid mixtures.

It is economically feasible to hot roll steel only to certain minimum sizes. For example, in rolling rounds, No. 5 rod, 0.220-inch diameter is about the smallest. On sizes smaller than this the metal lacks sufficient rigidity to be handled hot at high speeds. To produce smaller sizes it is necessary to work the metal cold as by wire drawing or cold rolling. These cold processes are used not only to produce smaller sizes but also to develop higher physical properties, closer tolerances and better finishes than are obtainable by hot rolling.

In wire drawing, the steel is first pickled or cleaned and then coated with a heavy layer of lime by dipping the coil or bar into a hot lime water suspension. The lime then dries on the surface of the metal to act as a lubricant and aid in holding other lubricants such as grease or alkaline soap powder, through which the metal passes immediately before being pulled through the die. Drawing stainless steel on a bench, for straight lengths, and a block, for coils, is shown in Figs. 6 and 7 respectively. Mainly because of the galling action, even on the best dies, the percent reduction in area, without annealing, is limited to 50 to 60 per cent with chrome-nickel stainless steels unless special coatings are applied to the wire. To obtain greater reductions and consequently higher strengths the metal is frequently coated with lead or a lead-tin alloy by dipping the steel into a molten bath. In still other instances, the wire is electrolytically coated with copper, to aid formability either in the mill or fabricating plant. Wire drawing dies used on stainless differ slightly in design from those used on ordinary steels because of the greater amount of heat generated. Speed with which the stainless is pulled through die is slower than usual.

To produce a perfect surface on round rods or wire, coils are straightened and cut to length and then passed through centerless grinders one or more passes as shown in Fig. 8.

Mills used for cold rolling stainless must be solidly built due to their greater stiffness as compared with alloy steels. No lubricants need be applied to the metal during cold rolling but oils are used occasionally. It is not necessary to anneal as frequently in cold rolling as in drawing because unlike a stationary drawing die, revolving rolls do not invite galling.

(To be continued)

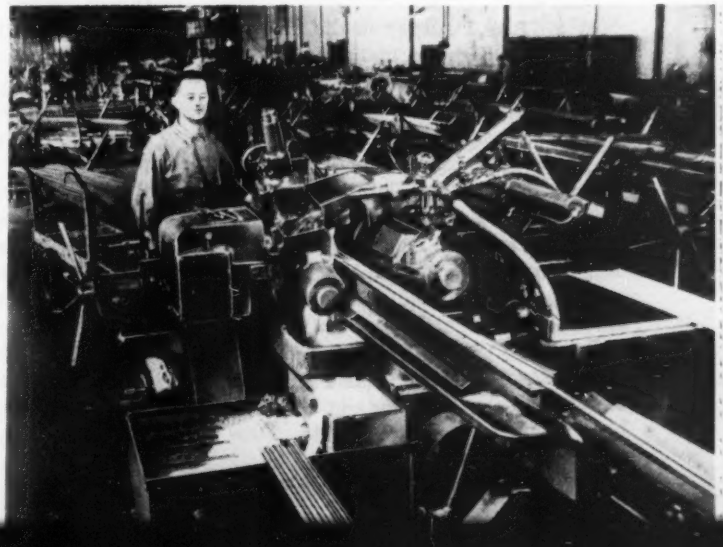


Fig 8—Centerless grinding stainless wire to remove surface defects and produce accurate size and pleasing finish

Age-Hardening Alloy

(*Concluded from Page 49*)

should be ordered to be of high purity welding grade.

Atomic Hydrogen Welding — This welding process works well on the material of suitable thickness 0.025 to 0.093-inch; welds are smooth and sound. On many jobs the inert gas metal arc process is preferred over atomic hydrogen due to the much smaller heated area and subsequent distortion. When using the atomic hydrogen processes care must be exercised to avoid overheating the weld puddle surface.

Oxyacetylene welding requires some additional development work. Sufficient weld tests have been made to indicate proper fluxes are not as yet available for use with this alloy.

Resistance Seam Welding — Some spot welding of the metal to itself has been done successfully in several shops. No unusual difficulties have been reported. Since the electrical resistance is high (740 ohms per cir. mil foot), the current used is relatively low. Relatively higher pressures than used for steel are required to produce adequate forging during nugget solidification. Cracking will not occur if the unit pressure is high (40,000 psi) or if pulses of post heating current are employed to reduce the unit stress by spreading the heat over a larger area.

Small amount of work done in spot or seam welding the alloy to other materials has not been too successful. It is difficult to obtain a conventional nugget without excessive surface burning, porosity, and expulsion. It is possible to obtain a "braze type weld" (nugget entirely contained within the sheet) rather easily.

Good butt welds have been made on the material to itself and to 4140 and 4340 ISI sheets. High unit pressures and good control of power during flashing and upset are essential.

Completes Survey on Carbon

A MARKET survey in the field of industrial carbon, including by-products, in relation to the Pacific Northwest has been completed by Ivan Block, consultant, for the United States Department of the Interior. The 87-page booklet deals with requirements for carbon as a reducing agent, and for electrodes, sources of carbon in the Pacific Northwest with notes on delivered prices and freight rates.

On the basis of current information, it seems apparent that Pacific Coast consumption of coke and coke breeze for industrial purposes is somewhere between 100,000 and 150,000 tons a year. Current consumption of petroleum coke for aluminum reduction is about 160,000 tons a year.

Copies of the report entitled "Carbon" are available from the Department of the Interior, Pacific Northwest Field Committee, 506 Failing Bldg., 618 S. W. Fifth Avenue, Portland 4, Ore.

Crane Features Flexibility

TO MEET expanding requirements of industry for bigger capacity, longer reach and higher lifts, plus the speed and flexibility of pneumatic-tire mounting, Bay City Shovels Inc., Bay City, Mich., is building a 25-ton capacity crane. Model 190-T61 CraneMobile is mounted on a three-axle crane carrier and is equipped with 10 tires and a Timken tandem rear axle unit. The model 190 CW CraneWagon is a self-propelled one-engine crane, mounted on a 6-wheel carrier equipped with 12 tires. Both have air brakes on all wheels.

New Machining Technique

PISTONS worth many thousands of dollars are being salvaged through unusual procedure in the replacement of damaged C-54 nose wheel piston cams. In this assembly the cams are attached to pistons with studs. In the original manufacture the cam and piston are drilled and tapped together and the threads in the cam are tapped and mated to the piston. As a result, position of the thread is different for each stud receptacle, making impossible tapping the replacement cam by normal procedures.

In the procedure developed by Texas Engineering & Mfg. Co. Inc., Dallas, a blank cam is laid out with a height gage and sine plate to match the particular piston on which it will be used. It is then drilled to the minor diameter of the ⅜-pipe thread with which the piston is tapped. Next the piston and cam are mated and a ⅝-18 thread tap, which cuts a shallower thread than the ⅜-pipe thread tap, is used from inside the piston to pick up the lead of the piston thread and score the inside of the holes in the cam.

Using the score as a guide, it is then easy to tap in the ⅜-pipe thread from the outside and mate it as perfectly to the thread in the piston as that of the original cam, the company states. Since the cam is a minor part of the piston assembly, the savings achieved have been significant.

LETTERS *to the Editors*

Sponge Iron

I would very much appreciate a reprint of the Kalling-Stalhed article on "The Wiberg-Soderfors Method for the Manufacture of Sponge Iron", appearing in STEEL, Sept. 19, 1949, page 72.

H. B. Emerick
Assistant Metallurgist
Jones & Laughlin Steel Corp.
Aliquippa, Pa.

Request fulfilled.—The Editors

The Dolly Manufacturer

Page 87 of the Sept. 12, 1949 issue of STEEL shows a photograph of a giant dolly mounted on Firestone tires. We are interested in obtaining further information on the manufacturer of this dolly.

F. J. Leanza
Development Engineer
New Holland Mfg. Co.
Mountville, Pa.

Eidal Mfg. Co., Albuquerque, N. Mex., is the manufacturer.—The Editors

Forming Process

On page 100 of the Sept. 26 issue of STEEL there is an article entitled "Sheet Metal Forming Method", describing a new metal forming method known as Marform. We are very much interested in this new method and would like more detailed information on the subject.

C. P. Terry
Assistant Advertising Manager
Hydraulic Press Mfg. Co.
Mt. Gilead, O.

On page 100 of the Sept. 26th issue of STEEL magazine, you have roughly outlined the "Marform process" of forming sheet metal. I would appreciate more information if available.

M. Hollo
Tool Engineer
P. D. Bates Co. Ltd.
Ridgetown, Ont.

We read with interest in the Sept. 26th issue, page 100, the article on sheet metal forming methods as developed by Glenn L. Martin Co. We would like to get some more information and will appreciate it if you will advise us to whom we should write.

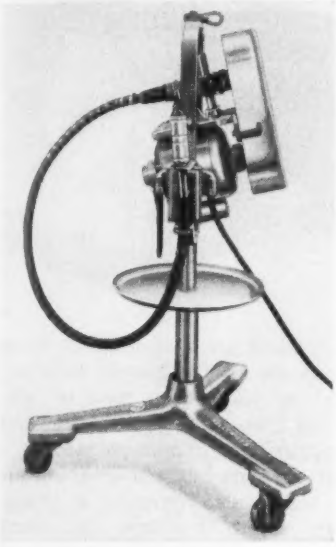
C. G. Hardwicke
Vice President
Hardwicke-Etter Co.
Sherman, Tex.

At present we have no further details on the Marform process. Method was developed by engineers of Glenn L. Martin Co., Baltimore, Md.—The Editors

New Products and Equipment

Flexible Shaft Machine

Operations such as burring, filing, sanding, grinding, wire brushing and polishing may be performed in many fields by the series M Kellerflex flexible shaft machine offered by Pratt & Whitney Division, West Hartford 1, Conn. It can be mounted on stand-



ard floor and bench stands or suspended. Power to the cable is transmitted without whip.

All fittings are standard for Pratt & Whitney attachments and handpieces are available in a large variety of styles, types and sizes. Unit is made with 16 constant shaft speeds, obtained by manually adjusting two clamps and rearranging the sheaves of the jackshaft pulley. One quarter or ¾-hp motors are optional.

Check No. 1 on Reply Card for more Details

DC Tachometer Generator

Featuring rubber-mounted ball bearings and an Alnico permanent magnet field which requires no separate excitation is the redesigned heavy duty direct current tachometer generator announced by General Electric Co., Schenectady 5, N. Y. Available in three models, the totally enclosed generator accurately measures speed of steel and aluminum mill machinery, mine hoists, wire-forming machines, etc. The end play is preloaded to 100 pounds to counteract the end thrust of the large machines to which the unit is to be mounted.

Output voltage is directly proportional to speed. Sufficient power is produced for control purposes and operation of an instrument simultaneously or operation of several instruments in parallel. Speed ranges for the three models are 100 to 1450, 100-2500 and 100-5000 rpm.

Check No. 2 on Reply Card for more Details

Single Action Hydraulic Press

Unit design of frame, cylinder and slide and use of a dual flow pumping system are incorporated in the 650-ton single action press developed by E. W. Bliss Co., 1420 Hastings St., Toledo 7, O. Simplified design of the press is intended to provide lower maintenance cost, smoother and quieter operation and increased production. Four adjustable flat type

Meehanite gibs with removable wear strips are located on uprights.

The foot valve is directly connected to cylinder and there is no interconnecting piping. The pump design permits reversing of oil flow and provides a controlled gravity descent with smooth starting and stopping as well as smooth release of pressure at the end of the pressure stroke. It is identified as the HS-650-H-36-36 press.

Check No. 3 on Reply Card for more Details

High Speed Wire Straightener

Greater capacity is designed into the type 3A Shuster wire straightener built by Mettler Machine Tool Inc., 132R Lawerence St., New Haven, Conn. Almost continuous wire travel, high speed cutoff and absolutely square ends are features of the machine which is capable of straightening from ¼ to ½-inch diameter wire (up to 9/16-inch in soft stock). Type 4A machine handles diameters from ⅜ to ⅝-inch, or up to 11/16-inch in soft stock.

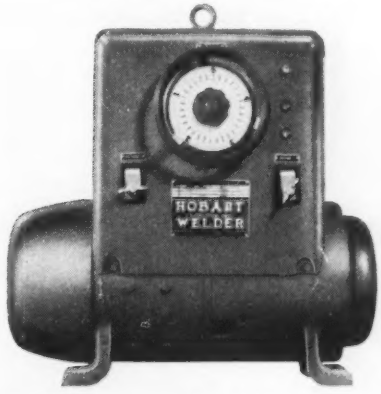
The direct driven, 5-die filer machine has a quiet V-belt motor drive and is equipped with ball and roller bearings throughout. Machine itself is extremely rigid.

Check No. 4 on Reply Card for more Details

Welder Has Five Current Ranges

Rated at 200 amp at 30 v on 50 per cent duty cycle is the model MZ-200-S, Bantam Champ direct current arc welder, made by Hobart Brothers Co., Box 489, Troy, O. Current range is from 40 to 250 amp at an operating speed of 3450 rpm. Five ranges of welding current and 100 steps of volt-ampere adjustment are available in each range.

Generator is of the multirange type with four laminated main poles and four interpoles which are removable. A squirrel cage induction-type electric motor is used and its rotor bars are welded to form a solid copper cage. Voltage change over terminals is provided on the starting



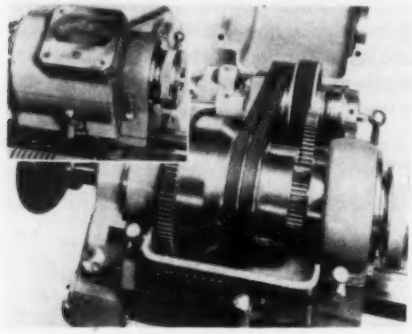
switch. Motor leads are brought out to the terminals on the starting switch and can be reconnected to change from 220 to 440 v power supply and vice versa.

Check No. 5 on Reply Card for more Details

Stepless Speeds Feature Lathe

Stepless spindle speeds from 32 to 2000 rpm feature the 1-inch collet capacity, 8½-inch swing Toolmaker's lathe of Wade Tool Co., Waltham, Mass. With back gears engaged on the model 8A lathe, the spindle speeds are from 32 to 220 rpm. The variable speed drive has an electric tachometer located on the face of the headstock housing to register spindle speeds. Operator can start, stop and brake the spindle while the motor is running.

Lathe has ample torque for low spindle speeds due to the back gear ratio of 9 to 1. Power is from a 1 hp motor. All countershaft bearings of the variable speed drive are ball bearings, permanently sealed. Lathe bed is in the shape of a hollow

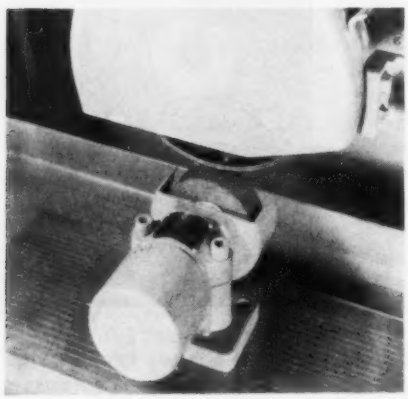


square, ribbed for rigidity. A case hardened steel tool block is mounted on the rear station of the compound cross slide for cutoff or form tools.

Check No. 6 on Reply Card for more Details

Device Trues Abrasive Wheels

Precision truing of newly mounted wheels, including metal bonded and vitrified bonded diamond abrasive wheels, may be performed with a new device known as the brake-controlled truing device, offered by Norton Co., New Bond St., Worcester 6,



Mass. It is compact, sturdily constructed and simple to set up and operate.

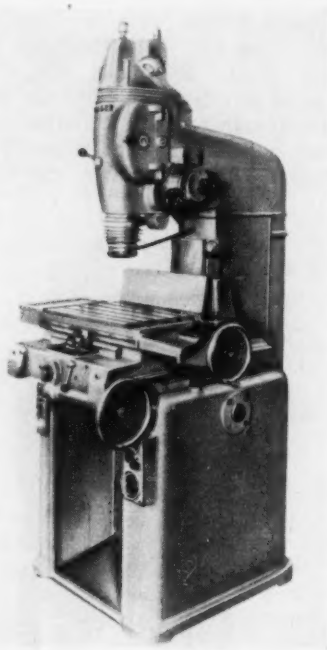
Unit is driven by the diamond wheel to be trued, eliminating the need for reducing the speed of the diamond wheel during the truing cycle.

Check No. 7 on Reply Card for more Details

Jig Grinder Has High Output

High output capacity and high accuracy are combined in the precision jig grinder made available by Hauser Machine Tool Corp., Manhasset, N. Y. The model 3S has a capacity grinding diameter of 5 inches and a quickly interchangeable spindle unit incorporating automatically-lubricated precision ball and roller bearings, driven by compressed air. By adjustment of airline pressure, spindle speeds up to 75,000 rpm are obtainable.

Bores are ground on the principle of the planetary spindle; small and medium size holes are ground with the normal high-speed grinding spindle while larger holes use a special set-off grinding head with eccentric adjustment. Provision is made



for grinding tapered holes. Spindle rotation and reciprocation can be stopped to facilitate gaging and inspection of the work during grinding. Table working surface measures 12¾ x 22 inches and has a longitudinal travel of 16 inches and a transverse travel of 10 inches.

Check No. 8 on Reply Card for more Details

Stock Feed Speeds Output

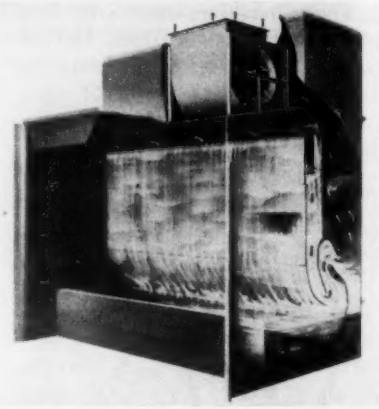
Possible speed adjustment from 66 to 838 strokes per minute is incorporated in the harmonic stock feed, an accessory for presses made by Denison Engineering Co., 1160 Dublin Rd., Columbus 16, O. Strip stock may be fed with an accuracy of plus or minus 0.002-inch for each cycle. Tonnage, preset before the operation is started, is applied with identical pressure for each successive stroke.

Die pile-ups will not damage either press or dies. Maximum stock thickness which may be handled is 3/64-inch and ram stroke varies from 1/8 to 2½ inches. Maximum feed stroke is 3 inches and maximum strip width is 3 inches. Stepless variation is possible for all adjustments. Accessory is available for up to 8-ton operation.

Check No. 9 on Reply Card for more Details

Spray Booth Washes Air

As paint-laden air is drawn both over and under the water curtain simultaneously in the Roto-Wash paint

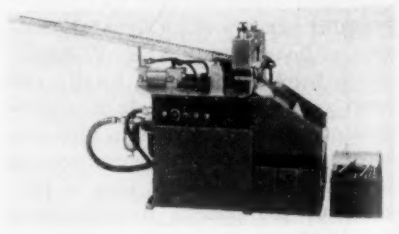


spray booth announced by Newcomb-Detroit Co., 5741 Russell, Detroit 11, Mich., a more even flow of air is created across the face of the booth. Trapping the maximum amount of paint overspray in the spraying area, the booth also permits a prewash of air before it enters the washing section of the booth. Washing action is created by suction from the exhaust fan. As the air leaves the booth, its velocity decreases sharply, thereby separating air and water. Remaining water is separated as the air passes the moisture separator before entering the exhaust fan. Design of the booth reduces maintenance to the minimum.

Check No. 10 on Reply Card for more Details

Gages Fit Individual Needs

Typical of the individual needs for volume of product which can be designed into automatic and semiautomatic inspecting and sorting equipment made by Brown & Sharpe Mfg. Co., Providence 1, R. I., are provision



for manual loading and disposal, manual loading and automatic disposal or automatic loading and automatic disposal. Machines are able to segregate a product into any number of categories and each category

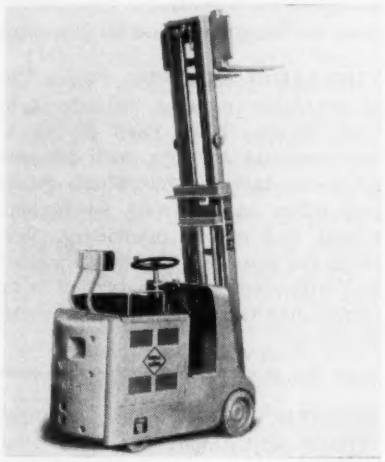
can be of any dimensional "width."

Machine illustrated gages and sorts straight sleeves, measuring for length and diameter at both ends. Sleeves are measured into four categories: Oversize and undersize in length regardless of diameter; small in diameter at either or both ends; either or both ends large in diameter; good sleeves, within tolerance. Production rate is about 3000 per hour and capacity is adjustable for various lengths and diameters. It is manually loaded with automatic disposal.

Check No. 11 on Reply Card for more Details

High Lift Truck is Compact

Designed for interplant materials handling and for outside work is a small gas-powered fork-lift truck introduced by Elwell-Parker Electric Co., Cleveland, O. Equipped with a



17 hp air-cooled engine, its lifting-lowering and tilting mechanisms are controlled by two levers located near the steering wheel. Overall length including a 30-inch fork is 102 inches. Width is 32½ inches and height with upright telescope is 83½ inches and extended 139 inches. Maximum lift is 121½ inches.

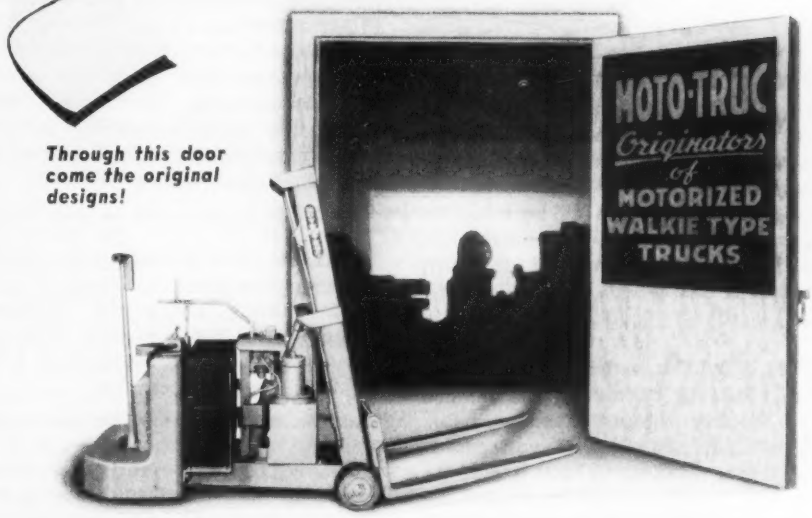
Travel speed with 2000-pound capacity load is 6½ mph. Driver may step off truck from either side. Each of the widely spaced cylinders for the hydraulic lifting system are placed at opposite sides of the upright column, affording good vision of load and travelway.

Check No. 12 on Reply Card for more Details

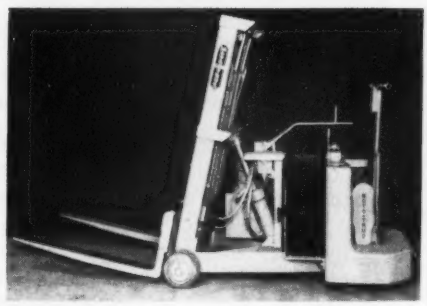
High Lift Truck for Pallets

For use with single or double faced pallets is the Red Giant hydraulic hand lift truck, made by Revolvator Co., North Bergen, N. J. Truck is easily operated and maneuvered and may be used with any standard pallet. By a slide plane arrangement

Announcing Another "first" by **MOTO-TRUC** **18 VOLTS**



Through this door come the original designs!

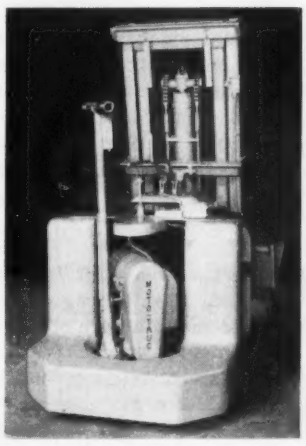


● 18 - Volt Counterbalance, Tilting Mast, Hi-Lift Telescopic, Battery Operated Motorized Walkie Type Truck, one of the big attractions at the National Metal Show, Cleveland.

The 18 volts give plus power for maximum efficiency in moving this type of truck with capacity loads, and ramp operation.

18 VOLT COUNTERBALANCE

MODEL	CAPACITY	FORK LIFT	COLLAPSED MAST HT.	TILT	TELESCOPIC	LOAD LENGTH	CHASSIS LENGTH	CHASSIS WIDTH
CB-120-25	2500#	120"	83"	Yes	Yes	36"	64"	36"
CB-120-20	2000#	120"	83"	Yes	Yes	48"	64"	36"
CB-94-25	2500#	94"	72"	Yes	Yes	48"	64"	36"
CB-63-25	2500#	63"	83"	Yes	NO	48"	64"	36"
CB-63-20	2000#	63"	83"	NO	NO	48"	64"	36"



This Counterbalance truck has the easy control for which Moto-Trucs are famous. A turn of the wrist on easy grip roller type handle gives two speeds forward and two speeds reverse. Raising and tilting controls are within easy reach.

***The* MOTO-TRUC Co.**
1953 E. 59th St., Cleveland 3, Ohio

the forks are raised and lowered, permitting the dual wheels in each fork to roll over sills, cross members of double faced pallets and up ramps.

Truck load is raised 4 inches by pumping the handle. Handle rotates 360 degrees and will lift in any position. Lowering is by foot lever at any speed desired and fall is cushioned to prevent noise and jar.

Check No. 13 on Reply Card for more Details

• • •

WIRE STRIPPER: High Speed Hammer Co. Inc., Rochester 5, N. Y., announces a high speed wire stripper that instantly and completely removes insulation from ends of solid, stranded, multiconductor cable or wire up to ½-inch in diameter. A positive adjustable stop is provided for any length of stripping up to 1½ inches.

Check No. 14 on Reply Card for more Details

CELL-FILLER: A new and improved Exide battery cell-filler is announced by Electric Storage Battery Co., Philadelphia 32, Pa. It will enable maintenance men to add water to storage batteries used in electric industrial trucks and tractors quickly and easily.

Check No. 15 on Reply Card for more Details

LIVE CENTERS: Ball bearing construction of the live centers made by Montgomery & Co., New York 7, N. Y., eliminates burning and regrinding, permits heavy load capacity and makes it possible for it to take a thrust load to 60,000 pounds. Available in 12 different standard models, 25 different semistandard models or made to specifications.

Check No. 16 on Reply Card for more Details

SWITCHES: Arrow-Hart & Hegeman Electric Co., Hartford, Conn., announce a new line of custom-built push-pull-selector switches. It provides a single master switch control that responds to operator's selection. Eight to 16 positions can be set up on the single dial.

Check No. 17 on Reply Card for more Details

SEALING DEVICE: Autoclench drives a self-closing staple wherever it touches and as fast as it touches. The tight closure cannot be loosened by dampness or refrigeration. Device weighs only 2 pounds and is made by Bostitch, Westerly, R. I.

Check No. 18 on Reply Card for more Details

FULL VOLTAGE STARTER: A new wall-mounted, starter adaptable for use in chemical, liquid fuel, milling, coal handling and other industries in which corrosive vapors or combustible dust laden atmospheres are present, is announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis. Type 371 has its entire mechanism immersed in oil and sealed from the atmosphere. It controls squirrel cage motors and primary of wound rotor motors of 350 hp or less at 2300 v.

Check No. 19 on Reply Card for more Details

PILLOW BLOCKS: Development of a series of normal and heavy-duty spherical roller bearing pillow blocks is announced by Fafnir Bearing Co., New Britain, Conn. Spherical roller bearings for these units are made by Torrington Co., Torrington, Conn. Pillow blocks will be available in bore sizes ranging from 2 7/16 inches to approximately 8 inches.

Check No. 20 on Reply Card for more Details

HEATER: For producing hot water in large quantities, A. Gunthard Co., Ennis, Texas, offers the Hy-Flow heater. It is made in nine different normal sizes with a capacity of 3960 to 31,500 gallons per hour.

Check No. 21 on Reply Card for more Details

PLUG VALVE: Durco type A valve is a top lubricated plug valve for general chemical service at medium pressures. Made by Duriron Co. Inc., Dayton 1, O., it combines bodies of corrosion resisting ductile alloys with hard corrosion resisting plugs.

Check No. 22 on Reply Card for more Details

PLATE MAGNETS: Redesign of the line of nonelectric standard and jumbo plate magnets is announced by Eriez Mfg. Co., Erie, Pa. These plate type permanent magnets will remove tramp iron from material traveling in chutes, spouts or in pneumatic lines. Available for installation in metal or wooden chutes, feed tables, hoppers, etc.; sizes range from 4 to 72 inches wide in increments of 2 inches.

Check No. 23 on Reply Card for more Details

DUMPING DEVICE: To handle loose parts, a skip box dumping device was developed by Towmotor Corp., Cleveland, O. The three-sided box is fitted with metal rings at the back. Special hooks on lift truck carriage engage these rings when box is lifted by forks. To dump box, operator actuates a double acting hydraulic cylinder which raises hooks, tilts box.

Check No. 24 on Reply Card for more Details

INSTRUMENT VALVES: Forged steel instrument valves built by Edward Valves Inc., East Chicago, Ind., are useful in the manufacture of small control equipment which is accompanied by an instrument valve. They are available in globe or angle design in ¼, ⅜ and ½-inch sizes with screwed or socket welding ends and are constructed of carbon steel, 13 per cent chromium stainless steel or 18-8 stainless steel.

Check No. 25 on Reply Card for more Details

SAFETY DEVICE: Black, Sivalls & Bryson Inc., Kansas City 6, Mo., offers a safety device that combines the patented VVH pressure vacuum vent valve with a flame arrestor bank which acts to prevent propagation of flame into storage tanks containing volatile liquids.

Check No. 26 on Reply Card for more Details

ASSEMBLY KIT: Powered pallet-loader replacement kit, announced by Aerol Co. Inc., Burbank, Calif., is a wheel assembly that eliminates gouging and chipping of floor on sharp turns. This is accomplished by differential action obtained through a series of three independently rotating rubber tired wheels.

Check No. 27 on Reply Card for more Details

VIBRATION MOUNTS: Finflex CM-H vibration mounts, introduced by Finn & Co., New York 30, N. Y., are designed for use with precision grinders, lathes, generators, pumps and other installations where horizontal and rotary machinery vibrations are present. Vibration isolation and attendant noise reduction is accomplished through "rubber-in-shear" principle.

Check No. 28 on Reply Card for more Details

HOLDER: A new holder featuring vertical adjustment has been developed by Bokum Tool Co., Detroit, Mich., to accommodate the company's large boring and threading tools. It is bored to take shanks of 1½-inch diameter directly and with split bushings it will accept tool shanks down to ½-inch diameter.

Check No. 29 on Reply Card for more Details

HANDLING ARMS: From one to four drums or barrels of material may be safely handled at the same time without pallets with the new four drum handling arms that are available for the Hyster Load-Grab attachment mounted on the 40 lift truck made by Hyster Co., Portland 8, Oreg.

Check No. 30 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

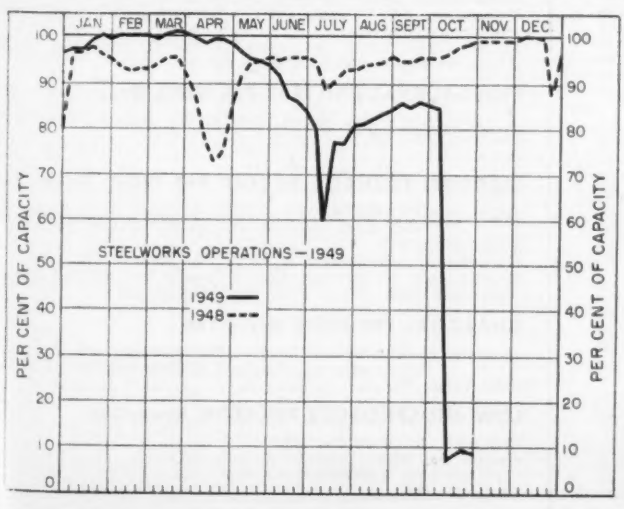
ADVERSE effects of the steel strike will be felt in the metalworking industries for many weeks after the walkout ends. Whether the work stoppage ends soon or extends into November, so much steel production will have been lost that supply difficulties will be felt into early 1950, at least in the popular products. This condition will hamper fabricating operations until the mills again approach balance between supply and demand. This, in the opinion of most observers, will take several months.

PRODUCTION—Close to 6 million tons of ingots are estimated lost in the first four weeks of the strike. Add to this an additional couple million tons that will be lost while the mills are resuming their pre-strike production pace, assuming the walkout ends shortly, and it appears 1949 steel output will probably not top 76 million tons, lowest postwar annual tonnage since 1946, another strike year, when only 67 million tons were turned out. Even if post-strike operations push to 100 per cent before yearend, which is unlikely, it will take the mills well into first quarter to make up the loss.

OPERATIONS— Steelmaking facilities have been strikebound now for the same number of weeks as in the early 1946 strike. During the period the ingot rate has averaged 8.5 per cent of capacity, which was better than that in the 1946 walkout. However, several additional plant shutdowns are in prospect over the next week which will bring the current rate down possibly another point or two. Last week the national ingot rate eased ½ point to 9 per cent of capacity, equal to production of only 166,000 tons. A month ago the rate was 84.5 and production 1,559,000 tons. A year ago operations were placed at 99 per cent with output running at a weekly rate of 1,782,000 tons. Last week operations declined 6 points to 46 per cent in the Cincinnati area and 4½ points to 80 per cent in St. Louis. An increase of 3 points to 58 per cent was reported in New England. Other district rates held unchanged.

DEMAND—Increasing maladjustments in fabricating activities are accompanied by noticeable easing off in steel demand as contrasted with early in the strike. Even prompt shipment tonnage from warehouses is under less pressure and gray market offerings are being declined. Some of the easing is attributable to "hold shipment" orders being received in increasing number by fabricators. To date fabricating operations have held up surprisingly well in face of shrinking steel supplies. But now, with the situation approaching crisis stage, operating curtailments are accelerating alarmingly and widespread plant shutdowns by mid-November threaten. With some form of rationing threatened post-strike, especially of the popular products, some consumers have continued to drive hard for position in mill rolling schedules. On the other hand there has been a disinclination on the part of some buyers to order too far ahead. This position is fairly general except for flat-rolled items and possibly pipe, for which there appears to be no limit to willingness of consumers to order ahead. Only restraint on part of the mills is keeping some users of these products from placing orders for shipment beyond first quarter.

PRICES—STEEL's weighted index of finished steel held unchanged last week at 152.52 compared with 151.86 a year ago, while the arithmetical price composite held at $91.64 and compared with $95.05. Price composite on steelmaking scrap increased to $26.67 from $26.17 and compared with $43.25 a year ago. Sentiment is mixed in the scrap market with the tone stronger at Chicago and somewhat easier at Pittsburgh. Buying is sluggish. Pig iron composites held unchanged and compared with those for the like week a year ago as follows: Basic, $45.60 and $46.29; No. 2 foundry, $46.10 and $46.69; malleable, $47.27 and $47.41.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Oct. 29	Change	Same Week 1948	Same Week 1947
Pittsburgh	3.5	None	97.5	104
Chicago	5.5	None*	99.5	94.5
Eastern Pa.	8.5	None	95	92
Youngstown	0	None	104	92
Wheeling	61	None	90	93.5
Cleveland	0	None	99	92.5
Buffalo	0	None	104	88.5
Birmingham	6	None	100	99
New England	58	+ 3	87	86
Cincinnati	46	— 6	104	94
St. Louis	80	— 4.5	89.5	80
Detroit	37	None	100	86
Western	21.5	+ 0.5	..	..
Estimated national rate	9	— 0.5	99	96.5

Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947. *Change from revised rate.

Composite Market Averages

	Oct. 27 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	152.52	152.52	152.52	151.86	99.16
Index in cents per lb ..	4.132	4.132	4.132	4.114	2.686
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$91.64	$91.64	$91.55	$95.05	$56.73
No. 2 Fdry Pig Iron, GT	46.10	46.10	46.10	46.69	23.67
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.41	24.29
Basic Pig Iron, GT.....	45.60	45.60	45.60	46.29	23.00
Steelmaking Scrap, GT..	26.67	26.17	27.58	43.25	16.00

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Oct. 27 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh ...	3.35	3.35	3.35	3.35–55	2.15
Bars, H.R., del. Phila. ...	3.83	3.83	3.83	3.79	2.47
Bars, H.R., Chicago	3.35	3.35	3.35	3.35	2.15
Bars, C. F., Pittsburgh	3.95-4.00	3.95-4.00	3.95-4.00	3.95-4.25	2.65
Bars, C.F., Chicago	4.00	4.00	4.00	4.00	2.65
Shapes, Std., Pittsburgh ..	3.25	3.25	3.25	3.25–30	2.10
Shapes, Std., Chicago	3.25	3.25	3.25	3.25	2.10
Shapes, del. Phila.	3.50	3.50	3.50	3.48	2.215
Plates, Pittsburgh	3.40	3.40	3.40	3.40–60	2.10
Plates, Chicago	3.40	3.40	3.40	3.40	2.10
Plates, Coatesville, Pa. ..	3.50	3.50	3.50	3.75	2.10
Plates, Sparrows Point, Md.	3.40	3.40	3.40	3.45	2.10
Plates, Claymont, Del.	3.50	3.50	3.50	3.95	2.10
Plates, del. Phila.	3.59	3.59	3.59	3.71	2.15
Sheets, H.R., Pittsburgh ..	3.25	3.25	3.25	3.25–30	2.10
Sheets, H.R., Chicago	3.25	3.25	3.25	3.25	2.10
Sheets, C.R., Pittsburgh ..	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Chicago	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Detroit	4.20	4.20	4.20	4.20	3.15
Sheets, Galv., Pittsburgh ..	4.40	4.40	4.40	4.40	3.50
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.25–70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh ...	4.00	4.00	4.00	4.00–75	2.80
Strip, C.R., Chicago	4.00–15	4.00–15	4.00–15	4.00–25	2.90
Strip, C.R., Detroit	4.20–25	4.20–25	4.20–25	4.20–50	2.90
Wire, Basic, Pittsburgh ...	4.15	4.15	4.15	4.15-4.50	2.60
Nails, Wire, Pittsburgh ...	5.15	5.15	5.15	5.15-6.30	2.55
Tin plate, box, Pittsburgh.	$7.75	$7.75	$7.75	$6.70	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$61.00	$61.00	$61.00	$61.00	$40.00
Sheet bar, mill(NT)	51.78–52.00	51.78–52.00	52.00–53.57	67.00	34.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$", Pitts. ..	3.40	3.40	3.40	3.40-4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$24.50
Basic, Valley	46.00	46.00	46.00	46.00	23.50
Basic, del. Phila.	49.44	49.44	49.44	50.17	24.58
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00-46.50	24.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.67	25.46
No. 2 Fdry, Birmingham..	39.38	39.38	39.38	43.38	20.38
No. 2 Fdry.(Birm.)del Cin.	46.08	46.08	46.08	49.09	24.06
Malleable, Valley	46.50	46.50	46.50	46.50	24.00
Malleable, Chicago	46.50	46.50	46.50	46.50	24.00
Charcoal, Lyles, Tenn.	60.00	60.00	60.00	62.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	135.00

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts. ..	$29.00	$29.00	$29.75	$42.75	$17.75
No. 1 Heavy Melt. E. Pa..	23.50	24.00	25.00	45.25	15.50
No. 1 Heavy Melt. Chicago	27.50	25.50	28.00	41.75	16.50
No. 1 Heavy Melt. Valley..	29.25	31.25	31.25	42.75	16.25
No. 1 Heavy Melt. Cleve...	26.00	26.50	26.50	42.25	15.25
No. 1 Heavy Melt. Buffalo.	27.25	27.25	28.25	48.50	17.00
Rails, Rerolling, Chicago..	41.50	41.50	41.50	66.50	22.25
No. 1 Cast, Chicago	41.50	41.50	41.50	70.50	20.00

COKE, Gross Ton

Beehive, Furn., Connlsvl.	$13.25	$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. .	15.75	15.75	15.75	17.00	7.75
Oven, Fdry, Chicago	20.00	20.00	20.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	17.625	17.625	17.625	23.50	12.00
Zinc, E. St. Louis	9.25–50	9.25	10.00	15.50	8.25
Lead, St. Louis	12.80	12.80	14.55	19.30–35	6.35
Tin, New York	95.00	95.75	96.00	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	32.00	32.00	38.50	38.50	14.50
Nickel, refinery, duty paid	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del.	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham,Ala. R2, S9	38.88	39.38	....	....
Woodward,Ala. W15	38.88	39.38	....	....
Cincinnati,del.	....	46.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawanda,N.Y. W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y. T9	....	46.50	47.00	....
Boston, del.	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14	46.00	46.50	46.50	....
So.Chicago,Ill. C3	46.00	....	46.50	47.00
So.Chicago,Ill. Y1	46.00	46.50	46.50	....
Milwaukee,del.	47.89	48.39	48.39	48.89
Muskegon,Mich.del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron, del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass. E1	....	50.50	51.00	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg., del.	....	54.20	....	....
LosAngeles,SanFrancisco,del. ...	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del.(incl. tax)	48.65	49.15	49.65	....
Ironton,Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts.N.&S. sides,Ambridge, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRocks,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.44
Verona,del.	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville,O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del.	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y. R2	48.00	48.50	49.00	....
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O.,del.	50.26	50.76	50.76	51.26

* Low phos, Southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade. 1.75–2.25%.
Phosphorous: Deduct 38 cents per ton for P content of 0.70% and over.
Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; Add $1 for each 0.5% Si to 11.50%)

Jackson,O. J1, G2	$59.50
Buffalo H1	60.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2.....	77.00
Keokuk,Iowa, OH & Fdry, 12½ lb. piglets, frt. allowed K2..	82.00
Wenatchee,Wash. OH & Fdry, frt. allowed K2	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$60.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$51.00
Steelton,Pa. B2	54.00
Philadelphia delivered	57.09
Troy,N.Y. R2	54.00

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

Semifinished and Finished Steel Products

Mill prices as reported to STEEL Oct. 27, 1949; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)

Detroit R7 .....$50.00
Munhall,Pa. C3 .....50.00

INGOTS, Alloy (NT)

Detroit R7 .....$51.00
Houston,Tex. S5 .....99.00
Midland,Pa. C18 .....51.00
Munhall,Pa. C3 .....51.00
So.Duquesne,Pa. C3 ...51.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Bessemer,Pa. C3 .....$52.00
Clairton,Pa. C3 .....52.00
Conshohocken,Pa. A3 ..51.00
Ensley,Ala. T2 .....52.00
Fairfield,Ala. T2 .....52.00
Fontana,Calif. K1 .....71.00
Gary,Ind. C3 .....52.00
Johnstown,Pa. B2 .....52.00
Lackawanna,N.Y. B2 ..52.00
Munhall,Pa. C3 .....52.00
Sharon,Pa. S3 .....52.00
So.Chicago,Ill. C3 .....52.00
So.Duquesne,Pa. C3 ...52.00

Carbon, Forging (NT)

Bessemer,Pa. C3 .....$61.00
Buffalo R2 .....61.00
Canton,O. R2 .....61.00
Clairton,Pa. C3 .....61.00
Cleveland R2 .....61.00
Conshohocken,Pa. A3 ..63.00
Detroit R7 .....61.00
Ensley,Ala. T2 .....61.00
Fairfield,Ala. T2 .....61.00
Fontana,Calif. K1 ....80.00
Gary,Ind. C3 .....61.00
Geneva,Utah G1 .....61.00
Houston,Tex. S5 .....69.00
Ind.Harbor,Ind. I-2 ...61.00
Johnstown,Pa. B2 .....61.00
Lackawanna,N.Y. B2 ..61.00
Munhall,Pa. C3 .....61.00
So.Duquesne,Pa. C3 ...61.00
So.Chicago,Ill. C3, R2..61.00
Warren,O. C17 .....61.00

Alloy (NT)

Bethlehem,Pa. B2 ....$63.00
Buffalo R2 .....63.00
Canton,O. R2, T7.....63.00
Conshohocken,Pa. A3 ..65.00
Detroit R7 .....63.00
Fontana,Calif. K1 ....82.00
Gary,Ind. C3 .....63.00
Houston,Tex. S5 .....71.00
Johnstown,Pa. B2 .....63.00
Lackawanna,N.Y. B2 ..63.00
Massillon,O. R2 .....63.00
Midland,Pa. C18 .....63.00
Munhall,Pa. C3 .....63.00
Sharon,Pa. S3 .....63.00
So.Chicago,Ill. C3, R2..63.00
So.Duquesne,Pa. C3 ...63.00
Warren,O. C17 .....63.00

SHEET BARS (NT)

Mansfield,O. E6..(GT)$58.00
Portsmouth,O. P12 ....52.00
Sharon,Pa. S3 .....52.00

ROUNDS, SEAMLESS TUBE (NT)

Canton,O. R2 .....$76.00
Cleveland R2 .....76.00
Ind.Harbor,Ind. I-2 ...76.00
Massillon,O. R2 .....76.00
So.Chicago,Ill. R2 ....76.00

SKELP

Aliquippa,Pa. J5 .....3.25
Munhall,Pa. C3 .....3.25
Warren,O. R2 .....3.25
Youngstown C3, R2 ....3.25

WIRE RODS

AlabamaCity,Ala. R2 ..3.40
Cleveland A7 .....3.40
Donora,Pa. A7 .....3.40
Fairfield,Ala. T2 .....3.40
Houston,Tex. S5 .....3.95
Ind.Harbor,Ind. Y1 ....3.40
Johnstown,Pa. B2 .....3.40
Joliet,Ill. A7 .....3.40
LosAngeles B3 .....4.20
Monessen,Pa. P7 .....3.40
Pittsburg,Calif. C11 ....4.05
Portsmouth,O. P12 .....3.40
So.Chicago,Ill. R2 .....3.40
SparrowsPoint B2 .....3.50
Sterling,Ill.(1) N15 ....3.40
Struthers,O. Y1 .....3.40
Torrance,Calif. C11 ....4.20
Worcester,Mass. A7 ....3.70

STRUCTURALS Wide Flange

Bethlehem,Pa. B2 .....3.30
Lackawanna,N.Y. B2 ..3.30
Munhall,Pa. C3 .....3.20
So.Chicago,Ill. C3 .....3.20

H.-S. Low-Alloy

Aliquippa,Pa. J5 .....4.95
Bessemer,Ala. T2 .....4.95
Bethlehem,Pa.(14) B2 ..5.05
Clairton,Pa. C3 .....4.95
Fairfield,Ala. T2 .....4.95
Fontana,Calif. K1 .....6.10
Gary,Ind. C3 .....4.95
Ind.Harbor,Ind. I-2, Y1.4.95
Johnstown,Pa. B2 .....5.05
Lackawna,N.Y.(14) B2 .5.05
Munhall,Pa.(14) C3 ....4.95
So.Chicago,Ill.(14) C3 ..4.95
Struthers,O. Y1 .....4.95

Carbon Steel Stand. Shapes

Aliquippa,Pa. J5 .....3.25
Bessemer,Ala. T2 .....3.25
Bethlehem,Pa. B2 .....3.30
Clairton,Pa. C3 .....3.25
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....3.80
Gary,Ind. C3 .....3.25
Geneva,Utah G1 .....3.25
Houston,Tex. S5 .....3.65
Ind.Harbor,Ind. I-2 ....3.25
Johnstown,Pa. B2 .....3.30
KansasCity,Mo. S5 ....3.85
Lackawanna,N.Y. B2 ..3.30
LosAngeles B3 .....3.85
Minnequa,Colo. C10 ....3.75
Munhall,Pa. C3 .....3.25
Niles,Calif.(22) P1 ....3.97
Portland,Oreg. O4 .....3.90
Seattle B3 .....3.90
So.Chicago,Ill. C3, W14 .3.25
So.SanFrancisco B3 ....3.80
Torrance,Calif. C11 ....3.85
Weirton,W.Va. W6 .....3.25

Alloy Stand. Shapes

Clairton,Pa. C3 .....4.05
Fontana,Calif. K1 .....5.25
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05

SHEET STEEL PILING

Ind.Harbor,Ind. I-2 ....4.05
Lackawanna,N.Y. B2 ...4.05
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05
Weirton,W.Va. W6 .....4.05

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ..3.40
Aliquippa,Pa. J5 .....3.40
Ashland,Ky.(15) A10 ...3.40
Bessemer,Ala. T2 .....3.40
Clairton,Pa. C3 .....3.40
Claymont,Del. W16 ....3.50
Cleveland J5, R2 .....3.40
Coatesville,Pa. L7 .....3.50
Conshohocken,Pa. A3 ...3.50
Ecorse,Mich. G5 .....3.65
Fairfield,Ala. T2 .....3.40
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.40
Geneva,Utah G1 .....3.40
Harrisburg,Pa. C5 .....3.75
Houston,Tex. S5 .....3.80
Ind.Harbor,Ind. I-2, Y1.3.40
Johnstown,Pa. B2 .....3.40
Lackawanna,N.Y. B2 ..3.40
Minnequa,Colo. C10 ....4.30
Munhall,Pa. C3 .....3.40
Pittsburgh J5 .....3.40
Seattle B3 .....4.30
Sharon,Pa. S3 .....3.40
So.Chicago,Ill. C3, W14 .3.40
SparrowsPoint,Md. B2 ..3.40
Steubenville,O. W10 ....3.40
Warren,O. R2 .....3.40
Weirton,W.Va. W6 .....3.40
Youngstown C3, Y1 ....3.40

PLATES (Universal Mill)

Fontana,Calif. K1 .....4.30

PLATES, Open-Hearth Alloy

Coatesville,Pa. L7 .....4.50
Conshohocken,Pa. A3 ..4.40
Fontana,Calif. K1 .....5.40
Gary,Ind. C3 .....4.40
Johnstown,Pa. B2 .....4.40
Munhall,Pa. C3 .....4.40
Sharon,Pa. S3 .....4.40
So.Chicago,Ill. C3 .....4.40
SparrowsPoint,Md. B2 ..4.40

PLATES, Ingot Iron

Ashland,cl(15) A10 ....3.65
Ashland,lcl(15) A10 ....4.15
Cleveland,cl R2 .....3.65
Warren,O.,cl R2 .....3.65

PLATES, Wrought Iron

Economy,Pa. B14 .....7.85

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5 .....5.20
Bessemer,Ala. T2 .....5.20
Clairton,Pa. C3 .....5.20
Cleveland J5, R2 .....5.20
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 .....5.40
Fairfield,Ala. T2 .....5.20
Fontana,Calif. K1 .....5.80
Gary,Ind. C3 .....5.20
Geneva,Utah G1 .....5.20
Houston,Tex. S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.20
Johnstown,Pa. B2 .....5.20
Munhall,Pa. C3 .....5.20
Pittsburgh J5 .....5.20
Sharon,Pa. S3 .....5.65
So.Chicago,Ill. C3 .....5.20
SparrowsPoint,Md. B2 ..5.20
Warren,O. R2 .....5.20
Youngstown Y1 .....5.20

FLOOR PLATES

Cleveland J5 .....4.55
Conshohocken,Pa. A3 ...4.55
Harrisburg,Pa. C5 .....4.55
Ind.Harbor,Ind. I-2 ....4.55
Munhall,Pa. C3 .....4.55
So.Chicago,Ill. C3 .....4.55

BARS, Hot-Rolled Carbon

AlabamaCity,Ala. R2 ...3.35
Aliquippa,Pa. J5 .....3.35
Alton,Ill.(1) L1 .....3.35
Ashland,Ky. (17) A10 ..3.35
Atlanta,Ga. A11 .....3.50
Bessemer,Ala. T2 .....3.35
Buffalo R2 .....3.35
Canton,O. R2 .....3.35
Clairton,Pa. C3 .....3.35
Cleveland R2 .....3.35
Ecorse,Mich. G5 .....3.55
Emeryville,Calif. J7 ....4.10
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.35
Houston,Tex. S5 .....3.75
Ind.Harbor,Ind. I-2, Y1.3.35
Johnstown,Pa. B2 .....3.35
KansasCity,Mo. S5 .....3.95
Lackawanna,N.Y. B2 ..3.35
LosAngeles B3 .....4.05
Marion,O. P11 .....3.35
Midland,Pa. C18 .....3.35
Milton,Pa. B6 .....3.35
Minnequa,Colo. C10 ....3.85
Niles,Calif. P1 .....4.05
N.Tonawanda,N.Y. B11 .3.35
Pittsburg,Calif. C11 ....4.05
Pittsburgh J5 .....3.35
Portland,Oreg. O4 .....4.10
Seattle B3, N14 .....4.10
S.Chicago C3, R2, W14..3.35
So.Duquesne,Pa. C3 ....3.35
S.SanFran.,Cal. B3 ....4.10
Struthers,O. Y1 .....3.35
Torrance,Calif. C11 ....4.05
Weirton,W.Va. W6 .....3.35
Youngstown C3, R2 ....3.35

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....3.35
Atlanta,Ga. A11 .....3.50
Bethlehem,Pa.(2) B2 ...3.55
Johnstown,Pa. B2 .....3.35
Lackawanna,N.Y. B2 ..3.35
Niles,Calif. P1 .....4.05
Pittsburgh(23) J5 .....3.35
Portland,Oreg. O4 .....4.10
SanFrancisco S7 .....4.05
Weirton,W.Va. W6 ....3.35

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....3.75
Buffalo R2 .....3.75
Canton,O. R2, T7 .....3.75
Clairton,Pa. C3 .....3.75
Ecorse,Mich. G5 .....4.05
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....3.75
Houston,Tex. S5 .....4.15
Ind.Harbor,Ind. I-2, Y1.3.75
Johnstown,Pa. B2 .....3.75
KansasCity,Mo. S5 .....4.35
Lackawanna,N.Y. B2 ..3.75
LosAngeles B3 .....4.80
Massillon,O. R2 .....3.75
Midland,Pa. C18 .....3.75
S.Chicago C3, R2, W14..3.75
So.Duquesne,Pa. C3 ....3.75
Struthers,O. Y1 .....3.75
Warren,O. C17 .....3.75
Youngstown C3 .....3.75

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. C3 .....4.00
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....4.00
Youngstown C3 .....4.00

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy

Aliquippa,Pa. J5 .....5.10
Bessemer,Ala. T2 .....5.10
Bethlehem,Pa. B2 .....5.10
Clairton,Pa. C3 .....5.10
Cleveland R2 .....5.10
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.10
Fontana,Calif. K1 .....6.15
Gary,Ind. C3 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa. B2 .....5.10
Lackawanna,N.Y. B2 ..5.10
Pittsburgh J5 .....5.10
So.Duquesne,Pa. C3 ....5.10
Struthers,O. Y1 .....5.10
Youngstown C3 .....5.10

BARS, Cold-Finished Carbon

Aliquippa,Pa. K5 .....4.00
Ambridge,Pa. W18 .....4.00
BeaverFalls, M12, R2...4.00
Buffalo B5 .....4.00
Camden,N.J. P13 .....4.48
Carnegie,Pa. C12 .....4.00
Chicago W18 .....4.00
Cleveland A7, C20 .....4.00
Cumberland,Md. C19 ...3.95
Donora,Pa. A7 .....4.00
Ecorse,Mich. G5 .....4.30
Elyria,O. W8 .....4.00
FranklinPark,Ill. N5 ...4.00
Gary,Ind. R2 .....4.00
Hammond,Ind. L2, M13.4.00
Hartford,Conn. R2 .....4.40
Harvey,Ill. B5 .....4.00
Indianapolis M13 .....4.20
LosAngeles R2 .....5.40
Mansfield,Mass. B5 ....4.40
Massillon,O. R2, R8....4.00
Midland,Pa. C18 .....4.00
Monaca,Pa. S17 .....4.00
Newark,N.J. W18 .....4.40
Plymouth,Mich P5 .....4.25
Pittsburgh J5 .....3.95
Putnam,Conn. W18 .....4.40
Readville,Mass. C14 ....4.40
St.Louis,Mo. M5 .....4.35
So.Chicago,Ill. W14 .....4.00
SpringCity,Pa.(5) K3 ..4.48
Struthers,O. Y1 .....4.00
Waukegan,Ill. A7 .....4.00
Youngstown F3, Y1.....4.00

BARS, Cold-Finished Alloy

Aliquippa,Pa. K5 .....4.65
Ambridge,Pa. W18 .....4.65
BeaverFalls,Pa. M12 ...4.65
Bethlehem,Pa. B2 .....4.65
Buffalo B5 .....4.65
Canton,O. R2, T7.....4.65
Carnegie,Pa. C12 .....4.65
Chicago W18 .....4.65
Cleveland A7, C20 .....4.65
Donora,Pa. A7 .....4.65
Elyria,O. W8 .....4.65
Gary,Ind. R2 .....4.65
Hammond,Ind. L2, M13.4.65
Hartford,Conn. R2 .....4.95
Harvey,Ill. B5 .....4.65
Indianapolis M13 .....4.85
Lackawanna,N.Y. B2 ..4.65
Mansfield, Mass. B5...4.95
Massillon,O. R2, R8....4.65
Midland,Pa. C18 .....4.65
Monaca,Pa. S17 .....4.65
Newark,N.J. W18 .....4.95
So.Chicago,Ill. R2, W14.4.65
Struthers,O. Y1 .....4.65
Waukegan,Ill. A7 .....4.65
Worcester,Mass. A7 ....4.95
Youngstown F3, Y1.....4.65

BARS, Reinforcing (Fabricators)

AlabamaCity,Ala. R2 ..3.35
Alton,Ill.(6) L1 .....3.35
Atlanta,Ga. A11 .....3.50
Buffalo R2 .....3.35
Cleveland R2 .....3.35
Emeryville,Calif. J7 ....4.10
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.35
Houston,Tex. S5 .....3.75
Ind.Harbor,Ind. I-2, Y1.3.35
Johnstown,Pa. B2 .....3.35
KansasCity, Mo. S5....3.95
Lackawanna,N.Y. B2 ..3.35
LosAngeles B3 .....4.05
Minnequa,Colo. C10 ....4.25
Niles,Calif. P1 .....4.05
Pittsburg,Calif. C11 ....4.05
Pittsburgh J5 .....3.35
Portland,Oreg. O4 .....4.10
Seattle, Wash. B3, N14..4.10
So.Chicago,Ill. R2 .....3.35
So.Duquesne,Pa. C3 ....3.35
So.SanFrancisco B3 ....4.10
SparrowsPoint,Md. B2..3.35
Struthers,O. Y1 .....3.35
Torrance,Calif. C11 ....4.05
Youngstown C3, R2 ....3.35

BARS, Reinforcing (Fabricated; to Consumers)

Huntington,W.Va. W7 ..4.50
Jonnstown,¼-1" B2 ....4.25
LosAngeles B3 .....5.00
Marion,O. P11 .....4.25
Pittsburgh J5 .....4.25
Seattle B3, N14 .....5.00
So.SanFrancisco B3 ....5.00
SparrowsPt.,1⅛-1¼" B2.4.83
SparrowsPt.,¼-1" B2 ..4.25

RAIL STEEL BARS

Chicagoints.,Ill.(3) I-2 ..3.25
FortWorth,Tex.(4) T4 ..4.33
Hntngtn,W.Va.(3,4) W7.3.35
Moline,Ill.(3) R2 .....3.35
Williamsport(2,3) S19 ..3.35
Williamsport(4) S19 ...3.85

BARS, Wrought Iron

Economy,Pa.(S.R.)B14..9.50
Economy,Pa.(D.R.)B14.11.00
Economy(Stablt) B14 ..11.30
McK.Rks.(S.R.) L5 ....8.60
McK.Rks.(D.R.) L5 ...11.25
McK.Rks.(Staybolt) L5.12.75

BARS, Hot-Rolled Ingot Iron

Ashland,Ky.(17) A10 ...3.60

SHEETS, Hot-Rolled Steel (18 gage and heavier)

AlabamaCity,Ala. R2 ..3.25
Ashland,Ky.(8) A10 ...3.25
Butler,Pa. A10 .....3.25
Cleveland J5, R2 .....3.25
Conshohocken,Pa. A3 ..3.35
Ecorse,Mich.(8) G5 ....3.45
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....4.15
Gary,Ind. C3 .....3.25
Ind.Harbor,Ind. I-2, Y1..3.25
Irvin,Pa. C3 .....3.25
Kokomo,Ind. C16 .....3.35
Lackawanna,N.Y. B2 ..3.25
Munhall,Pa. C3 .....3.25
Niles,O. M4 .....3.25
Pittsburg,Calif. C11 ....3.95
Pittsburgh J5 .....3.25
Sharon,Pa. S3 .....3.25
So.Chicago,Ill. W14 ....3.25
SparrowsPoint,Md. B2 ..3.25
Steubenville,O. W10 ....3.25
Torrance,Calif. C11 ....3.95
Warren,O. R2 .....3.25
Weirton,W.Va. W6 .....3.25
Youngstown C3, Y1 ....3.25

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)

AlabamaCity,Ala. R2 ...4.40
Dover,O. R1 .....5.00
Fairfield,Ala. T2 .....4.15
Ind.Harbor,Ind. I-2 ....4.15
Kokomo,Ind. C16 .....4.25
Mansfield,O. E6 .....4.15
Niles,O. N12, M4 .....4.15
Torrance,Calif. C11 ....5.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.00
Cleveland J5 R2 .....4.00
Ecorse,Mich. G5 .....4.20
Fairfield,Ala. T2 .....4.00
Follansbee,W.Va. F4 ....4.00
Fontana,Calif. K1 .....4.90
Gary,Ind. C3 .....4.00
GraniteCity,Ill. G4 .....4.20
Ind.Harbor,Ind. I-2, Y1..4.00
Irvin,Pa. C3 .....4.00
Lackawanna,N.Y. B2 ..4.00
Middletown,O. A10 .....4.00
Niles,O. M4 .....4.00
Pittsburg,Calif. C11 ....4.95
Pittsburgh J5 .....4.00
SparrowsPoint,Md. B2 ..4.00
Steubenville,O. W10 ....4.00
Warren,O. R2 .....4.00
Weirton,W.Va. W6 .....4.00
Youngstown Y1 .....4.00

SHEETS, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5, R2 .....6.05
Ecorse,Mich. G5 .....6.25
Fontana,Calif. K1 .....6.95
Gary,Ind. C3 .....6.05
Ind.Harbor,Ind. I-2, Y1.6.05
Irvin,Pa. C3 .....6.05
Lackawanna,N.Y. B2 ..6.05
Pittsburgh J5 .....6.05
Sharon,Pa. S3 .....6.05
SparrowsPoint,Md. B2 ..6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 .....6.05
Youngstown Y1 .....6.05

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy

Cleveland J5, R2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Calif. K1	6.64
Gary,Ind. C3	4.95
Ind.Harbor,Ind. I-2, Y1	4.95
Irvin,Pa. C3	4.95
Lackawanna,N.Y. B2	4.95
Pittsburgh J5	4.95
Sharon,Pa. S3	4.95
So.Chicago,Ill. C3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.40
Dover,O. R1	5.40
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	4.50
MartinsFerry,O. W10	4.40
Niles,O. N12	4.40
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance,Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. C3	6.75
SparrowsPoint,Md. B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	4.95

SHEETS, Zincgrip No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2	5.15
Niles,O. R2	5.15
Weirton,W.Va. W6	5.00

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Culvert, No. 16 Flat

	Cu Alloy	Cu FE
Ashland A10	5.00	...
Canton,O. R2	5.05	5.50
Fairfield,Ala. T2	5.00	5.35
Gary C3	5.00	5.35
GraniteCity G4	5.40	5.70
Irvin C3	5.00	5.35
Kokomo C16	5.40	...
MartinsFy,O. W10	5.00	5.35
Pittsburg,Cal. C11	5.75	...
SparrowsPt. B2	5.00	...
Torrance,Cal. C11	5.75	...

SHEETS, Culvert, No. 16 Flat Ingot Iron

Ashland,Ky. A10	5.25

SHEETS, Well Casing

Torrance,Calif. C11	4.75
Youngstown C3	3.75

SHEETS, Aluminized

Butler,Pa. A10	7.75

SHEETS, Long Terne, Steel (No. 10; Commercial Quality)

BeechBotm.,W.Va. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Weirton,W.Va. W6	4.80

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville, O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$6.75
Gary,Ind. C3	6.65
Ind.Harbor,Ind. I-2	6.65
Irvin,Pa. C3	6.65
Weirton,W.Va. W6	6.65
Yorkville,O. W10	6.65

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Yorkville,O. W10	8.10

SHEETS, Coated Ternes, 12 lb

Gary,Ind. C3	8.95
Yorkville,O. W10	8.95

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.45	$6.70	$7.00
Fairfield,Ala. T2	6.55	6.80	7.10
Gary,Ill. C3	6.45	6.70	7.00
GraniteCity,Ill. G4	6.65	6.90	7.20
Ind.Harbor,Ind. I-2, Y1	6.45	6.70	7.00
Irvin,Pa. C3	6.45	6.70	7.00
Niles,O. R2	6.45	6.70	7.00
Pittsburg,Calif. C11	7.20	7.45	7.75
SparrowsPoint,Md. B2	6.55	6.80	7.10
Weirton,W.Va. W6	6.45	6.70	7.00
Yorkville,O. W10	6.45	6.70	7.00

SHEET SILICON (24 Gage Base)

	Field	Arm.	Elec.	Motor	Dyn.
BeechBottom,W.Va. W10	...	5.45	5.95	6.70	7.50
Brackenridge,Pa. A4	...	...	5.95	6.70	7.50
Follansbee,W.Va. F4	...	5.45	5.95	6.70	7.50
GraniteCity,Ill. G4	...	...	6.15	6.90	7.70
Ind.Harbor,Ind. I-2	5.15	5.45	5.95	...	...
Mansfield,O. E6	5.15	5.45	5.95	6.70	...
Niles,O. M4	5.15	5.45	5.95	...	...
Niles,O. N12	...	5.45	5.95	...	...
Toronto,O. F4	...	5.45	5.95	6.70	7.50
Vandergrift,Pa. C3	...	5.45	5.95	6.70	7.50
Warren,O. R2	...	5.45	5.95	6.70	...
Zanesville,O. A10	...	5.45	5.95	6.70	7.50

COILS AND CUT LENGTHS, Cold-Rolled, Silicon

	Field	Arm.	Elec.	Motor	Dyn.
Vandergrift,Pa. C3	...	5.70	6.20	6.95	7.75
Warren,O. R2	5.40	5.70	6.20	6.95	7.75

SHEETS, Silicon Transformer Grade

	72	65	58	52
BeechBottom,W.Va. W10	8.05	8.60	9.30	10.10
Brackenridge,Pa. A4	8.05	8.60	9.30	....
Follansbee,W.Va. F4	8.05	8.60	9.30	10.10
Toronto,O. F4	8.05	8.60	9.30	10.10
Vandergrift,Pa. C3	8.05	8.60	9.30	10.10
Zanesville,O. A10	8.05	8.60	9.30	10.10

COLD-REDUCED COILS and Cut Lengths, Silicon

	72	T-100	T-90	T-80
Butler,Pa. A10	...	12.35	13.60	14.85
Vandergrift,Pa. C3	8.30	11.35	12.60	13.85
Warren,O. R2	8.30	....	....	....

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.50
Cleveland R2	3.85
Ind.Harbor,Ind. I-2	3.50
Warren,O. R2	3.85

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.60
Middletown,O. A10	4.50
Warren,O. R2	4.60

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15
Ind.Harbor,Ind. I-2	4.95

SHEETS, Zincgrip No. 10 Flat, Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron, No. 12

Ashland,Ky.(8) A10	4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.40
Youngstown Y1	4.40

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$5.75
Fairfield,Ala. T2	5.85
Gary,Ind. C3	5.75
GraniteCity,Ill. G4	5.95
Ind.Harbor,Ind. I-2, Y1	5.75
Irvin,Pa. C3	5.75
Niles,O. R2	5.75
Pittsburg,Calif. C11	6.50
SparrowsPoint,Md. B2	5.85
Warren,O. R2	5.75
Weirton,W.Va. W6	5.75
Yorkville,O. W10	5.75

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.50	$7.75
Fairfield,Ala. T2	7.60	7.85
Gary C3	7.50	7.75
Gran.City,Ill. G4	7.70	7.95
Ind.Harb. I-2, Y1	7.50	7.75
Irvin,Pa. C3	7.50	7.75
Pitts.,Cal. C11	8.25	8.50
Sp.Pt.,Md. B2	7.60	7.85
Warren R2	7.50	7.75
Weirton W6	7.50	7.75
Yorkville,O. W10	7.50	7.75

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	3.85

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.60

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15	3.25
Butler,Pa. A10	3.25
Carnegie,Pa. S18	3.25
Cleveland J5	3.25
Detroit M1	3.45
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary, Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1	3.25
KansasCity,Mo.(9) S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa,Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11	3.30
Pittsburg,Calif. C11	4.00
Pittsburgh J5	3.25
Riverdale,Ill. A1	3.25
SanFrancisco S7	4.00
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3, Y1	3.25

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15	9.50
Pawtucket,R.I.(11) N8	9.50

STRIP, Cold-Finished, Spring Steel (Annealed)	0.25-0.40C	0.40-0.60C	0.60-0.80C	0.80-1.05C	1.05-1.35C
Bridgeprt,Conn.(10) S15	4.00	5.50	6.10	8.05	10.35
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	5.50	6.10	8.05	10.35
Chicago T6	4.25	5.65	6.25	8.20	10.50
Cleveland A7	4.00	5.50	6.10	8.05	10.35
Dover,O. G6	4.00	5.50	6.10	7.85	10.15
Harrison,N.J. C18	...	...	6.40	8.35	10.65
Mattapan,Mass. T6	4.50	5.80	6.40	8.35	10.65
NewBritn.,Conn.(10) S15	4.00	5.50	6.10	8.05	10.35
NewCastle,Pa. B4	4.00	5.50	6.10	...	....
NewYork W3	...	5.80	6.40	8.35	10.65
Pawtucket,R.I. N8 Cleve.orPitts.Base	4.55	5.50	6.10	8.05	10.35
Worcester,Mass.Base	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	4.00	5.50	6.10	8.05	10.35
Trenton,N.J. R5	...	6.30	6.90	8.85	11.15
Union,N.J. H6	4.40	6.35	6.35	8.30	10.50
Wallingford,Conn. W2	4.50	5.80	6.40	8.05	10.35
Weirton,W.Va. W6	4.00	5.50	6.10	8.05	10.35
Worcester,Mass. A7	4.30	5.80	6.40	8.35	10.65
Worcester,Mass. T6	4.50	5.80	6.40	8.35	10.65
Youngstown C8	4.50	5.50	6.10	8.05	10.35

Pawtucket,R.I.(12) N8	5.80
Sharon,Pa. S3	5.50
Worcester,Mass. A7	5.80
Youngstown C8	5.50

STRIP, Cold-Rolled Carbon

Berea,O. C7	6.10
Bridgeprt,Conn.(10) S15	4.00
Butler,Pa. A10	4.00
Chicago,Ill. T6	4.15
Cleveland A7, J5	4.00
Detroit D2, D3	4.25
Detroit M1	4.20
Dover,O. G6	4.00
Ecorse,Mich. G5	4.20
Follansbee,W.Va. F4	4.00
Fontana,Calif. K1	4.90
Ind.Harbor,Ind. I-2	4.00
Lackawanna,N.Y. B2	4.00
LosAngeles C1	5.00
Mattapan,Mass.(21) T6	4.50
Middletown,O. A10	4.00
NewBritain(10) S15	4.00
New Castle, Pa. B4, E5	4.00
NewHaven,Conn. A7, D2	4.50
NewKensington,Pa. A6	4.00
NewYork W3	5.00
Pawtucket,R.I.(11) N8	4.55
Pawtucket,R.I.(21) N8	4.50
Pawtucket,R.I. R3	4.50
Pittsburgh J5	4.00
Riverdale,Ill. A1	4.15
Sharon,Pa. S3	4.00
SparrowsPoint,Md. B2	4.00
Trenton,N.J.(13) R5	5.00
Wallingford,Conn. W2	4.50
Warren,O. R2, T5	4.00
Weirton,W.Va. W6	4.00
Youngstown C8, Y1	4.00

STRIP, Cold-Rolled, High-strength Low-Alloy

Cleveland A7, J5	6.05
Dover,O. G6	6.05
Ecorse,Mich. G5	6.25
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.05
Pittsburgh J5	6.05
Sharon,Pa. S3	6.05
SparrowsPoint,Md. B2	6.05
Warren,O. R2	6.05
Weirton,W.Va. W6	6.05
Youngstown Y1	6.05

STRIP, Electro Galvanized

Weirton,W.Va. W6	4.00
Youngstown C8	4.00

Key to Producing Companies

A1	Acme Steel Co.
A3	Alan Wood Steel Co.
A4	Allegheny Ludlum Steel
A6	American Shim Steel Co.
A7	American Steel & Wire
A8	Anchor Drawn Steel Co.
A9	Angell Nail & Chaplet
A10	Armco Steel Corp.
A11	Atlantic Steel Co.
B1	Babcock & Wilcox Tube
B2	Bethlehem Steel Co.
B3	Beth. Pac. Coast Steel
B4	Blair Strip Steel Co.
B5	Bliss & Laughlin Inc.
B6	Bolardi Steel Corp.
B8	Braeburn Alloy Steel
B11	Buffalo Bolt Co.
B14	A. M. Byers Co.
C1	Calif. Cold-Rolled Steel
C3	Carnegie-Illinois Steel
C4	Carpenter Steel Co
C5	Central Iron & Steel Div. Barium Steel Corp.
C7	Cleve. Cld. Roll. Mills Co.
C8	Cold Metal Products Co.
C9	Colonial Steel Co.
C10	Colorado Fuel & Iron
C11	Columbia Steel Co.
C12	Col. Steel & Shafting Co.
C13	Columbia Tool Steel Co.
C14	Compressed Steel Shaft.
C16	Continental Steel Corp.
C17	Copperweld Steel Co.
C18	Crucible Steel Co.
C19	Cumberland Steel Co.
C20	Cuyahoga Steel & Wire
D2	Detroit Steel Corp.
D3	Detroit Tube & Steel Co.
D4	Disston & Sons, Henry
D6	Driver Harris Co.
E1	Eastrn. Gas&Fuel Assoc.
E2	Eastern Stainless Steel
E4	Electro Metallurgical Co.
E5	Elliott Bros. Steel Co.
E6	Empire Steel Co.
F2	Firth Sterling Steel
F3	Fitzsimons Steel Co.
F4	Follansbee Steel Corp.
F6	Fretz-Moon Tube Co.
G1	Geneva Steel Co.
G2	Globe Iron Co.
G3	Globe Steel Tubes Co.
G4	Granite City Steel Co.
G5	Great Lakes Steel Corp.
G6	Greer Steel Co.
H1	Hanna Furnace Corp.
H4	Heppenstall Co.
H6	Hind Steel Co. Inc.
I-1	Igoe Bros. Inc.
I-2	Inland Steel Co.
I-3	Interlake Iron Corp.
I-4	Ingersoll Steel Div., Borg-Warner Corp.
J1	Jackson Iron & Steel Co.
J3	Jessop Steel Co.
J4	Johnson Steel & Wire Co.
J5	Jones & Laughlin Steel
J6	Joslyn Mfg. & Supply
J7	Judson Steel Corp.
K1	Kaiser Steel Corp.
K2	Keokuk Electro-Metals
K3	Keystone Drawn Steel
K4	Keystone Steel & Wire
K5	Kidd Drawn Steel Co.
L1	Laclede Steel Co.
L2	LaSalle Steel Co.
L3	Latrobe Electric Steel
L5	Lockhart Iron & Steel

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2 .....4.95
Cleveland J5 .....4.95
Ecorse,Mich. G5 .....5.15
Fairfield,Ala. T2 .....4.95
Fontana,Cal. K1 .....6.64
Gary,Ind. C3 .....4.95
Ind.Harb,Ind. I-2, Y1 ..4.95
Lackawanna,N.Y. B2 ...4.95
Pittsburgh J5 .....4.95
Sharon,Pa. S3 .....4.95
SparrowsPoint,Md. B2 ..4.95
Warren,O. R2 .....4.95
Weirton,W.Va. W6 ....4.95
Youngstown C3, Y1 ....4.95

TIGHT COOPERAGE HOOP

Atlanta A11 .....3.60
Riverdale,Ill. A1 .....3.60
Sharon,Pa. S3 .....3.60
Youngstown C3 .....3.60

WIRE, Cold-Rolled Flat

Chicago T6 .....5.35
Cleveland A7 .....5.00
Dover,O. G6 .....5.00
Fostoria,O. S1 .....5.50
Kokomo,Ind. C16 .....5.00
Massillon,O. R8 .....5.00
Monessen,Pa. P7 .....5.00
Pawtucket,R.I.(11) N8..5.55
Pawtucket,R.I.(12) N8..5.50
Trenton,N.J. R5 .....5.80
Worcester,Mass. A7 ....5.30
Worcester,Mass. T6 ....5.30

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(19) K4 ..7.70
Chicago W13 .....7.70
Cleveland A7 .....7.70
Fostoria,O. S1 .....7.70
Johnstown,Pa. B2 .....7.70
Kokomo,Ind. C16 .....7.70
Portsmouth,O. P12 ....7.70
Struthers,O. Y1 .....7.70
Trenton,N.J. R5 .....8.50
Waukegan,Ill. A7 .....7.70
Worcester,Mass. A7, T6.8.00

WIRE (16 gage)	An'ld. Galv. Stone	Stone
Aliquippa J5	9.05	10.55
Bartnvill(19) K4.	9.05	10.55
Cleveland A7 ...	9.05	10.55
Fostoria,O. S1 ..	9.15	10.65
Johnstown B2 ...	9.05	10.55
Kokomo C16	9.05	10.10
Minnequa C10 ...	9.40	10.90
Pitts.Cal. C11 ..	9.40	10.90
Prtsmth.(18) P12	9.05	10.55
SparrowsPt., B2 .	9.15	10.65
Struthers Y1	9.05	10.55
Waukegan A7 ..	9.05	10.55

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2 ..4.15
Aliquippa,Pa. J5 .....4.15
Alton,Ill.(1) L1 .....4.15
Bartonville,Ill.(1) K4 ..4.15
Buffalo W12 .....4.15
Chicago W13 .....4.15
Cleveland A7, C20 .....4.15
Crawfrdsvll,Ind. M8 ...4.30
Donora,Pa. A7 .....4.15
Duluth A7 .....4.15
Fairfield,Ala. T2 .....4.15
Fostoria,O.(24) S1 ....4.50
Houston S5 .....4.55
Johnstown,Pa. B2 .....4.15
Joliet,Ill. A7 .....4.15
KansasCity,Mo. S5 .....4.75
Kokomo,Ind. C16 .....4.25
LosAngeles B3 .....5.10
Millbury,Mass.(12) N6..4.45
Minnequa,Colo. C10 ....4.50
Monessen,Pa. P7 .....4.15
Newark,6-8ga. I-1 ....4.75
No.Tonawanda B11 ....4.18
Palmer,Mass. W12 ....4.45
Pittsburg,Calif. C11 ....5.10
Portsmouth,O. P12 ....4.15
Rankin,Pa. A7 .....4.15
So.Chicago,Ill. R2 .....4.15
So.SanFrancisco C10 ...5.10
SparrowsPoint,Md. B2 ..4.25
Sterling,Ill.(1) N15 ....4.15
Struthers,O. Y1 .....4.15
Torrance,Calif. C11 .....5.10
Waukegan,Ill. A7 .....4.15
Worcester,Mass. A7,T6..4.45

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....5.55
Alton,Ill(1) L1 .....5.55
Bartonville,Ill.(19) K4 ..5.55
Buffalo W12 .....5.55
Cleveland A7 .....5.55
Donora,Pa. A7 .....5.55
Duluth A7 .....5.55
Fostoria,O. S1 .....6.05
Johnstown,Pa. B2 .....5.55
LosAngeles B3 .....6.50
Monessen,Pa. P7 .....5.55
Palmer,Mass. W12 ....5.85
Pittsburg,Calif. C11 ....6.50
Portsmouth,O. P12 .....5.55
So.Chicago,Ill. R2 .....5.55
SparrowsPoint,Md. B2 ..5.65
Struthers,O. Y1 .....5.55
Trenton,N.J. A7 .....5.85
Trenton,N.J. R5 .....6.35
Waukegan,Ill. A7 .....5.55
Worcester A7,J4,T6,W12.5.85

ROPE WIRE	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	7.10	7.40	7.80
Cleveland A7	7.50	7.80	8.20
Donora,Pa. A7	7.50	7.80	8.20
Fostoria,O. S1	8.00	8.30	8.70
Johnstown,Pa. B2	7.50	7.80	8.20
Monessen,Pa. P7	7.50	7.80	8.20
NewHaven,Conn. A7	7.80	8.10	8.50
Portsmouth,O. P12	7.50	7.80	8.20
SparrowsPoint,Md. B2	7.60	7.90	8.30
Struthers,O. Y1	7.50	7.80	8.20
Trenton,N.J. A7	7.80	8.10	8.50
Trenton,N.J. R5	8.00	8.30	8.70
Waukegan,Ill. A7	7.50	7.80	8.20
Williamsport,Pa. B2	7.60	7.90	8.30
Worcester,Mass. J4	7.50	7.80	8.20

WIRE, Merchant Quality (6 to 8 gage)

	An'ld.	Galv.
Ala.City, R2	4.80	5.25
Aliquippa J5	4.80	5.25
Atlanta A11	4.90	5.35
Bartnville.(19) K4	4.80	5.25
Cleveland A7 ...	4.80	5.25
Crawfrdvll. M8 .	4.95	5.40
Donora A7	4.80	5.25
Duluth A7	4.80	5.25
Fairfield T2	4.80	5.25
Houston,Tex. S5.	5.20	5.65
Johnstown B2 ...	4.80	5.25
Joliet,Ill. A7 ...	4.80	5.25
KansasCity,Mo. S5	5.40	5.85
Kokomo C16	4.90	5.35
LosAngeles B3 ..	5.75	...
Minnequa C10 ..	5.15	5.60
Monessen P7	4.80	5.25
Pitts.Cal. C11 ...	5.75	6.20
Portsmth.(18) P12	4.80	5.25
Rankin A7	4.80	5.25
So.Chicago R2 ...	4.80	5.25
So.S.Fran. C10 ..	5.75	6.20
SparrowsPt. B2 .	4.90	5.35
Sterling,Ill.(1) N15	4.80	5.25
Struthers,O. Y1 .	4.80	5.25
Torrance,Cal. C11	5.75	...
Worcester A7 ...	5.10	5.55

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....5.20
Alton,Ill.(1) L1 .....5.20
Cleveland A7 .....5.20
Donora,Pa. A7 .....5.20
Duluth A7 .....5.20
Johnstown,Pa. B2 .....5.20
LosAngeles B3 .....6.15
NewHaven,Conn. A7 ...5.50
Pittsburg,Calif. C11 ...6.15
Portsmouth,O. P12 .....5.20
So.Chicago,Ill. R2 .....5.20
SparrowsPoint,Md. B2 ..5.30
Struthers,O. Y1 .....5.20
Torrance,Calif. C11 ....6.15
Trenton,N.J. A7 .....5.50
Waukegan,Ill. A7 .....5.20
Worcester,Mass. A7 ....5.50

WIRE, Barbed	Col.
AlabamaCity,Ala. R2 ...123	
Aliquippa,Pa. J5 123	
Atlanta A11 125	
Bartonville,Ill.(19) K4 ..123	
Crawfordsville M8 126	
Donora,Pa. A7 123	
Duluth,Minn. A7 123	
Fairfield,Ala. T2 123	
Houston,Tex. S5 131	
Johnstown,Pa. B2 123	
Joliet,Ill. A7 123	
KansasCity,Mo. S5 135	
Kokomo,Ind. C16 125	
Minnequa,Colo. C10 130	
Monessen,Pa. P7 123	
Pittsburgh,Calif. C11 143	
Portsmouth,O.(18) P12..123	
Rankin,Pa. A7 123	
So.Chicago,Ill. R2 123	
So.SanFran.,Calif. C10...143	
SparrowsPoint,Md. B2 ..125	
Sterling,Ill(1) N15 123	

FENCE POSTS	Col.
Duluth A7 112	
Huntington,W.Va. W7 ..112	
Johnstown,Pa. B2 112	
Joliet,Ill. A7 112	
Minnequa,Colo. C10 120	
Moline,Ill. R2 116	
Williamspt,Pa., S19..n.t.$120	

WOVEN FENCE, 9-15½ gage

	Col.
Ala.City,Ala.,17-18ga. R2.175	
AlabamaCity,Ala. R2....109	
Aliquip.,Pa.9-14½ga. J5..109	
Atlanta A11 111	
Bartonville,Ill.(19) K4 ..109	
Crawfordsvll,Ind. M8 ...112	
Donora,Pa. A7 109	
Duluth A7 109	
Houston,Tex. S5 117	
Fairfield,Ala. T2 109	
Johnstown,Pa. B2 109	
Johnstn,17ga.,6" B2 183	
Johnstn,17ga.,4" B2 186	
Joliet,Ill. A7 109	
KansasCity,Mo. S5 121	
Kokomo,Ind. C16 111	
Minnequa,Colo. C10 116	
Monessen,Pa. P7 109	
Pittsburg,Calif. C11 132	
Portsmouth,O.(18) P12..109	
Rankin,Pa. A7 109	
So.Chicago,Ill. R2 109	
Sterling,Ill.(1) N15 109	

BALE TIES, Single Loop	Col.
AlabamaCity, Ala. R2 ...106	
Atlanta A11 107	
Bartonville,Ill.(19) K4 ..106	
Chicago W13 106	
Crawfordsville M8 109	
Donora,Pa. A7 106	
Duluth A7 106	
Fairfield,Ala. T2 106	
Joliet,Ill. A7 106	
Kokomo,Ind. C16 108	
Minnequa, Colo. C10 ...113	
Pittsburg,Calif. C11 130	
Portsmouth,O.(18) P12 .106	
So.Chicago,Ill. R2 106	
So.SanFran.,Calif. C10 ..130	
SparrowsPoint,Md. B2 ...108	
Sterling,Ill.(1) N15 106	

NAILS & STAPLES, Stock (To Dealers & Mfrs.)	
AlabamaCity,Ala. R2 ...103	
Aliquippa,Pa. J5 103	
Atlanta A11 105	
Bartonville,Ill.(19) K4 ..103	
Cleveland A9 110	
Crawfordsville M8 106	
Donora,Pa. A7 103	
Duluth A7 103	
Fairfield,Ala. T2 103	
Houston,Tex. S5 111	
Johnstown,Pa. B2 103	
Joliet,Ill. A7 103	
KansasCity,Mo. S5 115	
Kokomo,Ind. C16 105	
Minnequa, Colo. C10 110	
Monessen,Pa. P7 103	
Pittsburg,Calif. C11 122	
Portsmouth,O. P12 103	
Rankin,Pa. A7 103	
So.Chicago,Ill. R2 103	
SparrowsPoint,Md. B2 ..105	
Sterling,Ill.(1) N15 103	
Torrance,Calif. C11 123	
Worcester,Mass. A7 109	

NAILS & STAPLES, Stock (To Jobbers)	Col.
Chicago,Ill. W13 103	

Minnequa,Colo. C10 107
Portsmouth,O. P12 100

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2 ..5.20
Bartonville,Ill.(19) K4 ..5.20
Donora,Pa. A7 .....5.20
Duluth A7 .....5.20
Johnstown,Pa. B2 .....5.20
Joliet,Ill. A7 .....5.20
Kokomo,Ind. C16 .....5.30
Minnequa, Colo. C10 ....5.55
Pittsburg,Calif. C11 ....6.15
Portsmouth,O. P12 .....5.20
Rankin,Pa. A7 .....5.20
So.Chicago,Ill. R2 .....5.20
SparrowsPoint,Md. B2...5.30
Worcester,Mass. A7 ....5.50

NAILS, Cut (100 lb keg)

Conshohoken,Pa. A3 ..$6.75
Wheeling,W.Va. W10 ...6.75

AXLES

Fairfield,Ala. T2 .....5.20
Gary,Ind. C3 .....5.20
Ind.Harbor,Ind. S13 ....5.20
Johnstown,Pa. B2 .....5.20
McKeesRocks,Pa. C3 ....5.20

TIE PLATES

Fairfield,Ala. T2 .....4.05
Gary,Ind. C3 .....4.05
Ind.Harbor,Ind. I-2 ....4.05
Lackawanna,N.Y. B2 ....4.05
Minnequa,Colo. C10 ....4.05
Pittsburg,Calif. C11 ....4.20
Pittsburgh R2 .....4.05
Seattle B3 .....4.50
Steelton,Pa. B2 .....4.05
Torrance,Calif. C11 ....4.20
Weirton,W.Va. W6 .....4.05

JOINT BARS

Bessemer,Pa. C3 .....4.25
Fairfield,Ala. T2 .....4.25
Ind.Harbor,Ind. I-2 .....4.25
Joliet,Ill. C3 .....4.25
Lackawanna,N. Y. B2...4.25
Minnequa,Colo. C10.....4.25
Steelton,Pa. B2 .....4.25

TRACK BOLTS	(20)Treated
Fairfield,Ala. T2 .....8.50	
Lebanon,Pa. B2 .....8.50	
Minnequa,Colo. C10 ....8.25	
Pittsburgh,Pa. O3, P14 .8.50	

STANDARD TRACK SPIKES

Fairfield,Ala. T2 .....5.35
Ind.Harbor,Ind. I-2, Y1 .5.35
Lebanon,Pa. B2 .....5.35
Minnequa, Colo. C10 ...5.35
Pittsburgh J5 .....5.35
So.Chicago,Ill. R2 .....5.35
Struthers,O. Y1 .....5.35
Youngstown R2 .....5.35

LIGHT RAILS, Rail Steel

Huntington,W.Va. W7 ..3.55
Williamsport,Pa. S19 ...3.55

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb. Under
Bessemer,Pa. C3	3.20	3.10	3.15	3.55
Ensley,Ala. T2	3.20	3.10	3.15	3.55
Fairfield,Ala. T2	...	...	...	3.55
Gary,Ind. C3	3.20	3.10	3.15	...
Ind.Harbor,Ind. I-2	3.20	3.10	3.15	...
Johnstown,Pa. B2	...	...	...(16)	3.55
Lackawanna B2	3.20	3.10	...	3.55
Minnequa,Colo. C10	3.20	3.10	...	4.25
Steelton,Pa. B2	3.20	3.10	...	...

Key to Producing Companies

L6 Lone Star Steel Co.
L7 Lukens Steel Co.
M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Moltrup Steel Produc s
M13 Monarch Steel Co.
N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New Eng.High Carb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R7 Rotary Electric Steel Co.
R8 Reliance Div., Eaton Mfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U4 Universal-Cyclops Steel
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Co.
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn. Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	19.00	18W,4Cr,3V	114.50
Extra Carbon	22.00	18W,4Cr,2V,9Co	168.50
Spec. Carbon	26.50	18W,4Cr,2V,6Co	154.00
Oil Hardening	29.00	18.25W,4.25Cr,1V,4.75Co	142.00
Ht.-Carbon-Cr	52.00	20.25W,4.25Cr,1.6V,12.25Co	266.50
Cr Hot Wrk	29.00	1.5W,4Cr,1V,8.5Mo	65.00
18W,4Cr,1V	90.50	6.4W,4.5Cr,1.9V,5Mo	69.50
18W,4Cr,2V	102.50	6W,4Cr,3V,6Mo	88.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, R2, S8, T7, U4, V2, V3.

(1) Chicago Base. (2) Angles.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. Base.
(8) 16 gage and heavier.
(9) 6" and narrower.
(10) Pittsburgh Base.
(11) Cleveland & Pittsburgh Base.
(12) Worcester, Mass. Base.
(13) 3" & wider; over ½" to under 3" 5.50c.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh Base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. Base.
(22) Del. San Fran. Bay area.
(23) Angles 1"x1" to 1¼"x1¼" only.
(24) Deduct 0.35c for finer than 15 Ga.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	41.5	39.5	38.5	13.5	11.5	10.5
¼	6.0	0.42	39.5	37.5	36.5	15.5	13.5	12.5
⅜	6.0	0.57	36	34	33	12.5	10.5	9.5
½	8.5	0.85	43	41	42	26.5	24.5	25.5
¾	11.5	1.13	46	44	45	30.5	28.5	29.5
1	17.0	1.68	48.5	46.5	47.5	33.5	31.5	32.5
1¼	23.0	2.28	49	47	48	34	32	33
1½	27.5	2.73	49.5	47.5	48.5	34.5	32.5	33.5
2	37.0	3.68	50	48	49	35	33	34
2½	58.5	5.82	50.5	48.5	49.5	35.5	33.5	34.5
3	76.5	7.62	50.5	48.5	49.5	35.5	33.5	34.5

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va. 1½ percentage point lower on ⅛", 2 points lower on ¼", 3 points lower ⅜", W10; Wheatland, Pa., 2 points lower on ⅛ through ⅜", W9. Following make ½ through 3" only: Lorain, O. N3; Youngstown R2, Y1; Aliquippa, Pa. J5. Fontana, Calif., K1 quotes 11 points lower on ⅛" through 3".

Columns B & E: Sparrows Point, Md. B2; Wheatland, Pa., ⅛ through ⅜", W9.

Columns C & F: Alton, Ill. (Lorain, O. Base) LI; Indiana Harbor, Ind., ⅛ through 3", Y1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛ through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10; Wheatland, Pa., except 2 pts lower on ⅛ through ⅜" W9. Following make ½ through 3" only; Lorain N3; Youngstown R2, Y1; Aliquippa, Pa. J5. Fontana, Calif., K1 quotes 11 points lower on ⅛" through 3".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	38.5	23	38.5	23
2½	58.5	5.82	41.5	26	41.5	26
3	76.5	7.62	41.5	26	41.5	26
3½	92.0	9.20	43.5	28	43.5	28
4	$1.09	10.89	43.5	28	43.5	28
5	1.48	14.81	43.5	28	43.5	28
6	1.92	19.18	43.5	28	43.5	28

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 4 to 24 in., inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	11.50	13.39	13.00	13.00
1¼	13	13.62	15.87	13.21	15.39
1½	13	15.05	17.71	14.60	17.18
1¾	13	17.11	20.15	16.60	19.54
2	13	19.18	22.56	18.60	21.89
2¼	13	21.37	25.16	20.73	24.40
2½	12	23.54	27.70	22.83	26.88
2½	12	25.79	30.33	25.02	29.41
2¾	12	27.33	32.14	26.51	31.18
3	12	28.68	33.76	27.82	32.74
3¼	11	33.39	39.29	32.39	38.11
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78
4½	9	58.99	69.42	....	....
5	9	68.28	80.35	....	....
6	7	104.82	123.33	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pacific Tube Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

BOLTS, NUTS

(To consumers)

F.o.b. midwestern plants. Additional discounts on carriage, machine bolts, 5 for cl; 15 for full containers, except tire and plow bolts.

CARRIAGE, MACHINE BOLTS

(Per cent off list)

½-in., smaller; up to 6 in. long 35
⅝ & ¾ x 6 in., shorter. 37
⅝-in. & larger x 6 in., shorter 34
All diameters longer than 6-in. 30
Tire bolts 25
Plow bolts 47
Lag bolts, 6 in., shorter 37
Lag bolts, longer than 6 in. 35

NUTS

Semifinished hexagon	A.S. Light	Reg. & Heavy
⅞-in., smaller	.41 off	.....
½-in., smaller	....	38 off
⅝-in.-1-in.	....39 off	.....
1⅛-in.-1-in.	.....	37 off
1⅛-in.-1½-in.	.37 off	35 off
1⅝-in., larger	..34 off	28 off

Additional discount of 15 for full containers.

STOVE BOLTS

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

SQUARE HEAD SET SCREWS

Upset 1-in. & smaller..51 off
¾, ⅞, & 1 x 6-in. & shorter .....35 off
Headless, ¼-in., larger..31 off

HEXAGON CAP SCREWS

(Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright) ..... 46 off
Upset (1035 heat treated) ⅝ and smaller x 6 and shorter ..... 40 off

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 6.75c
⅞-in., under .....48 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers .....Net to $1 off

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	37.50	30.50	28.50
302...	37.50	33.00	28.50
303...	39.50	36.50	31.00
304...	39.50	35.00	30.00
309...	52.00	52.00	41.50
316...	53.00	55.00	46.00
321...	45.50	44.50	34.00
347...	50.00	48.50	38.50
410...	33.00	27.00	23.00
416...	33.50	33.50	23.50
420...	40.50	43.50	28.50
430...	35.50	27.50	23.50
501...	24.00	22.50	11.50
502...	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2
Baltimore, bars, wire and structurals A10
Brackenridge, Pa., sheets A4
Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4
Butler, Pa., sheets and strip except Types 309, 501 & 502 A10
Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18
Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7
Detroit, strip, except Type 309 quoted 51.00c M1
Dunkirk, N.Y., bars, wire A4
Duquesne, Pa., bars C3
Gary, Ind., sheets except Type 416 C3
Harrison, N. J., strip C18
Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c, Type 501 10.50c, Type 502 11.50c R2
McKeesport, Pa., bars; sheets except Type 416, C3
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2
Middletown, O., sheets and strip, except Types 501 and 502 and except 309 strip quoted 51.00c A10
Midland, sheets & strip C18
Munhall, Pa., bars C3
Pittsburgh, sheets C18
Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4
So. Chicago, Ind., bars & structurals C3
Syracuse, N. Y., bars, wire & structurals C18
Titusville, Pa., bars U4
Wallingford, Conn., strip W2
Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3
Washington, Pa., Types 301 through 347 sheets & strip except 303 & 309; 316 sheets 58.00c strip 60.00c W4
Watervliet, N. Y., structurals & bars A4
Waukegan, bars & wire A7
West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4
Youngstown, strip C8.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Inches Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4,5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00
	CARBON	
40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	84,90	7.50
14	60,72	8.00
10,12	60	8.25

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.

Imported, net ton, duty paid, metallurgical grade, $39-$40.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., Ottawa, Ill., $100. Hardfired, $135 at above points.

High-heat Duty: Salina, Pa. $85; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., Ottawa, Ill., $66.

LADLE BRICK

Dry Press: $55, Freeport, Merill Station, Clearfield, Pa., Chester, New Cumberland, W.Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., Ottawa, Ill., $90; Beach Creek, Pa., $80.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa., $85; Joliet or Rockdale, Ill., E. Chicago, Ind., $89; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., Birmingham, $80.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $81.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; Chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅝" grains; Bulk, $30.50-$31.00; single paper bags, $35.00-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersvile, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 20.00
Toluol, one deg. ..19.00-23.50
Industrial xylol ..20.50-26.50
Per ton bulk, ovens
Sulphate of ammonia ..$45.00
Per pound, ovens
Phenol, 40 (carlots, returnable drums) 13.25
Do., less than carlots..14.00
Do., tank cars 12.50

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon are for buyer's account.

Old range bessemer	$7.60
Old range nonbessemer	7.45
Mesabi bessemer	7.35
Mesabi nonbessemer	7.20
High phosphorus	7.20

EASTERN LOCAL ORE

Cents, unit, del. E. Pa. Foundry and basic 56.62% concentrates, contract 16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports
Swedish basic, 60 to 68%:
Spot: 17.00
Long-term contract..15.00
Brazil iron ore, 68-69% .19.50

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty pd.. $20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 81.8c-83.8c per long ton unit, c.i.f. U.S. ports; prices on lower grades adjusted to Mn content and impurities.

CHROME ORE

Gross ton f.o.b. cars, new York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African
48% 2.8:1 .....$35.00
48% 3:1 ..... 37.50
48% no ratio....28.50-29.00
South African Transvaal
44% no ratio....$19.00-20.00
45% no ratio....19.50-21.00
48% no ratio....27.00-28.00
50% no ratio....28.50-29.00
Brazilian
44% 2.5:1 lump.....$32.00
Rhodesian
45% no ratio....$20.00-21.00
48% no ratio....28.00-29.00
48% 3:1 lump 37.50
Domestic—rail nearest seller
48% 3:1 .....$39.00

MOLYBDENUM

Sulphide conc., lb, Mo, cont. Mines $0.90

METALLURGICAL COKE

Price per Net Ton

BEEHIVE OVENS

Connellsvil, fur.	$13.00-13.50
Connellsvil, fdry.	15.50-16.00
New River, foundry	18.00
Wise county, foundry	15.35
Wise county, furnace	14.60

OVEN FOUNDRY COKE

Kearny, N. J., ovens	$22.00
Everett, Mass., ovens New England, del.‡	22.70
Chicago, ovens	20.00
Chicago, del.	†21.45
Detroit, del.	23.91
Terre Haute, ovens	20.20
Milwaukee, ovens	20.75
Indianapolis, ovens	19.85
Chicago, del.	23.32
Cincinnati, del.	22.77
Detroit, del.	23.75
Ironton, O., ovens	19.40
Cincinnati, del.	21.63
Painesville, O., ovens	20.90
Buffalo, del.	23.02
Cleveland, del.	22.62
Erie, del.	21.04
Birmingham, ovens	17.70
Philadelphia, ovens	20.45
Swedeland, Pa., ovens	20.40
Portsmouth, O., ovens	19.50
Detroit, ovens	20.65
Detroit, del.	†21.70
Buffalo, del.	22.95
Flint, del.	23.00
Pontiac, del.	21.98
Saginaw, del.	23.30

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡Or within $4.03 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	5.60	6.51	7.10	5.82	...	5.77	6.31	8.28	5.53	5.85	7.36
New York(c'try)	5.40	6.31	6.90	5.62	...	5.57	6.11	8.08	5.33	5.65	7.16
Boston (city) ..	5.75	6.75**	7.16	5.80	...	5.72	6.22	8.77	5.62	5.95	7.45
Boston (c'try) .	5.55	6.55**	6.96	5.60	...	5.52	6.02	8.57	5.42	5.75	7.25
Phila. (city)...	5.90	6.49	6.88	5.65	...	5.65	6.21	8.10	5.35	5.60	6.80
Phila. (c'try) ..	5.65	6.24	6.63	5.40	...	5.40	5.96	7.85	5.10	5.35	6.55
Balt. (city)....	5.46	6.36	6.81	5.52	...	5.57	6.05	...	5.51	5.71	7.16
Balt. (c'try)...	5.31	6.21	6.66	5.37	...	5.42	5.91	...	5.36	5.56	7.01
Norfolk, Va. ..	5.80‡	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse).	6.07‡	...	...	5.83	...	5.88	6.62	...	5.82	6.02	7.47
Buffalo (del.)..	5.00‡	5.90	7.57	5.39	6.42	5.10	5.60	10.13	5.15	5.50	7.06
Buffalo (w'hse)	4.85‡	5.75	7.42	5.24	6.27	4.95	5.40	9.60	5.00	5.35	6.91
Pitts. (w'hse)..	4.85	5.75[4]*	6.80	5.00	6.00	4.90	5.40	9.20††	4.90	5.05	6.55
Detroit (w'hse).	5.32	6.22[4]*	7.35	5.42	6.42-6.73	5.48	5.90	8.44-8.59	5.48	5.67	7.02
Cleveland (del.)	5.00	5.90	6.70	5.15-5.18	6.15	5.15-5.16	5.60	7.84-8.00	5.15-5.16	5.35-5.36	6.80-6.81
Cleve. (w'hse) .	4.85	5.75	6.55	5.00-5.03	6.00	5.00-5.01	5.45	7.84-7.85	5.00-5.01	5.20-5.21	6.65-6.66
Cincin. (w'hse).	5.27‡	5.94**	6.83	5.39	6.10	5.44	5.95	...	5.44	5.64	7.05
Chicago (city) .	5.05	5.95[4]	7.05	5.05	6.35-6.85	5.10	5.60	7.90[8]	5.10	5.30	6.75
Chicago (w'hse)	4.85	5.75[4]	6.85	4.85	6.15-6.65	4.90	5.40	7.70[8]	4.90	5.10	6.55
Milwaukee (city)	5.18	6.08[4]	7.18	5.18	6.48-6.98	5.23	5.78	8.03[8]	5.23	5.43	6.88
Milwau. (c'try).	5.03	5.93[4]	7.03	5.03	6.33-6.83	5.08	5.63	7.88[8]	5.08	5.28	6.73
St. Louis (del.)	5.37	6.27[4]	7.44	5.34	6.64	5.39	6.19[6]	6.64	5.39	5.59	7.04
St. L. (w'hse) .	5.22	6.12[4]	7.29	5.19	6.49	5.24	6.04[6]	6.49	5.24	5.44	6.89
Birm'ham (city)	5.00	5.90	6.55	5.00	...	5.00	6.83	...	5.05	5.25	7.69
Birm'ham(c'try)	4.85	5.75	6.40	4.85	...	4.85	6.68	...	4.90	5.10	7.54
Omaha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.60	7.15	7.60	6.10	7.75	5.75	7.40	...	5.60	5.65	7.90
L. A. (w'hse)..	5.45	7.00	7.45	5.95	7.60	5.60	7.25	...	5.45	5.50	7.75
San Francisco..	6.15[10]	7.50[3]	7.80	6.75[10]	8.25[8]	5.90[10]	7.55	10.85[2]	5.90	6.35	8.10
Seattle-Tacoma.	6.70[7]‡	8.15[3]	8.80	6.70[7]	...	6.20[7]	8.15[1]	10.10	6.00[7]	6.35[7]	8.40[7]

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; ** 17 gage; †† as annealed. Base quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; galvanized sheets, 450 lb to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—1500 to 1999 lb; [9]—400 to 3999 lb; [10]—400 lb and over; [11]—500 to 1499 lb.

LEADING FERROALLOY PRODUCTS

Manganese Alloys

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17.5%, deduct 0.2c from above prices. Spot, add 0.25c.

Chromium Alloys

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload. 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l., lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.40c per lb of alloy, ton lots packed 8.80c, 200 to 1999 lb 9.15c, smaller lots 9.65c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

(Please turn to page 110)

Metal Fabricators Curtail Output

Inventories of raw materials become increasingly unbalanced by growing shortage of steel. Straits tin drops to 95.00c while prime western zinc rises to 9.25c to 9.50c

New York—Adverse effects of the steel strike are spreading rapidly throughout the nonferrous metal consuming industries. A large segment of the galvanizing and tinning industries closed Oct. 1 and now brass mills and other fabricators of metals are curtailing operations. The shutdown of steel mills is causing inventory dislocations which will become increasingly severe until the flow of steel resumes its normal rate. The decline in consumption has not undermined the price structure of major metal markets and has had only a mildly restraining influence on buying. Reconstruction Finance Corp. reduced the price of tin to the basis of 95.00c, New York, for prompt delivery of Grade A metal to meet the price which was established Sept. 26 by the British Ministry of Supply and which has been followed by the Dutch and Belgian producers. The price of zinc rose Thursday to a range of 9.25c to 9.50c, East St. Louis.

Copper—Many market observers believe copper would be selling at a higher level if the steel strike had not slowed general industrial activity. Bookings of copper for delivery in November exceed estimated mine production for that month, while inquiry for December copper indicates the shortage may continue to the yearend. Failure of workers at American Metal Co.'s Carteret copper refinery to accept the company's terms for a new working agreement will extend the shortage of certain shapes which has developed since the four-month old strike began at that plant.

Although inquiry continues heavy, sales are limited by the negligible tonnages available for November delivery. Prices hold at 17.62½c for electrolytic, delivered Connecticut.

Improvement in copper and brass mill business has been steady in the last five months. Actual consumption of copper totaled 114,760 tons in September compared with 88,088 tons in August and only 61,383 tons in May, the low for the year to date. Consumption last month was 11,645 tons in excess of intake. Fabricators' total stocks and purchases increased 3779 tons in September to 96,481 tons, while unfilled orders declined 8671 tons to 180,097 tons. This leaves a deficit of 83,616 tons in fabricators' stock position compared with 96,066 tons at the end of August and 151,060 tons at the beginning of the year.

Brass and Bronze Ingots—Manufacturers have increased prices ½-cent to ¾-cent a pound on most grades of brass and bronze ingots. The upward revision in prices is attributed solely to increased costs due to the advance in red metal scrap prices. Ingot makers are offering up to 14.75c for No. 1 copper, 13.75c for No. 2 and 12.75c for light copper. Although demand improved moderately in the third quarter, it is still light compared with bookings in the first quarter. The market is quoted 16.00c to 17.25c for ingot No. 115 in the 85-5-5-5 group, 25.25c for No. 215 in the 88-10-2 group, 21.75c for No. 305 in the 80-10-10 group, and 13.75c to 15.00c for No. 405 in the yellow ingot group.

Lead—Domestic shipments of refined lead declined 6419 tons in September to 29,640 tons, reports the American Bureau of Metal Statistics. This was the smallest movement since May and brought the total for the first nine months to 287,605 tons, or 111,275 tons less than were shipped during the like 1948 period. Shipments dropped to 14,064 tons in September from 18,802 tons in the previous month to unclassified users, to 9257 tons from 10,107 tons to battery makers, to 2342 tons from 3135 tons to sundries, to 150 tons from 630 tons to jobbers, to 120 tons from 310 tons to brass mills, and to 50 tons from 100 tons to foil manufacturers. Shipments to cable manufacturers increased to 3407 tons from 2725 tons while those to ammunitions makers held at 250 tons.

Production of refined lead declined to 36,103 tons in September from 39,362 tons, bringing the total for the first nine months to 412,293 tons compared with 399,138 tons for the like period a year ago. Of September's output, 35,033 tons were accounted for by primary producers and 1070 tons by secondary sources.

Stocks of lead at refineries at the close of September dropped to 61,538 tons from 76,782 tons at the end of August.

Only moderate tonnages of lead are being sold with prices unchanged at 12.80c, St. Louis.

Makers of batteries have reduced their purchases of lead in view of the probable curtailment in automobile production over the next few weeks. Battery makers are reducing their inventories.

Zinc—The price of zinc was increased ¼-cent a pound to 9.50c, East St. Louis, by a leading custom smelter on Oct. 27. This is the first change in the price of zinc since Oct. 3 when it was lowered ¾-cent from 10.00c. This sharp drop occurred immediately following the start of the steel strike. The advance came somewhat as a surprise to the trade since buying of the prime western grade had been confined chiefly to an occasional carlot. Bulk of activity has been in regular and special high grade zinc which is widely used in the automotive industry. The latter industry is expected to curtail its production in the next few weeks due to the growing shortage of steel and to model changeovers.

Tin—Small tonnages of Grade A tin are being sold at 94.87½c, New York, but no Straits tin has been involved in the transactions to date. This price is ⅛-cent under the 95-cent level established by the Reconstruction Finance Corp., effective as of Oct. 24, as its selling price for Grade A.

Speculative offers were reported in the trade last week as low as 92.50c for December delivery of Grade A tin but no actual sales at these levels were reported. Principal importers continue to ask 95.00c for October and November arrivals.

London Tin Mart To Reopen

London—Dealings in tin on the London Metal Exchange will be resumed Nov. 15, says George Strauss, British Minister of Supply. At that time the British government will abandon the bulk buying and selling of this metal. Trading in tin on the London Metal Exchange halted Dec. 8, 1941, with closing quotations for standard tin £259 for spot delivery and £262 for three months delivery, or the equivalent of 46.60c for spot and 47.15c for futures at $4.03 for sterling exchange. The British Ministry's price for standard tin, 99.75 per cent, is £757, or equivalent to 94.63c on the basis of $2.80 for sterling exchange.

World Tin Output Increases

New York—World production of tin in concentrates increased to 13,800 tons in August from 12,900 tons in July, according to preliminary statistics issued by the International Tin Study Group, The Hague, Netherlands. Smelter production of refined tin dropped to 13,900 tons from 14,000 tons. Production of tin plate slumped to 373,000 tons in August from 451,000 tons in the preceding month. Exports of tin in concentrates increased to 7200 tons from 7100 tons.

Acquires Anode Facilities

New York—Federated Metals Division, American Smelting & Refining Co. has acquired the facilities of Metallurgical Products Co., Philadelphia, for the production of electroplaters' anodes. Production will be concentrated at Federated's Perth Amboy, N. J., plant under the management of R. D. Taylor. Metallurgical Products Co. will continue to conduct its busines in alloy and specialty products.

Castings Shipments Increase

Washington—Shipments of copper and copper-base alloy castings increased 34 per cent in August to a total of 58,055,000 pounds, reports the Bureau of the Census. This compares with 43,273,000 pounds in July and 81,976,000 pounds in August, 1948. Of the August, 1949, shipments, 53,203,000 pounds were sand castings. Total shipments of all kinds of copper castings amounted to only 480,607,000 pounds in the first eight months of the year compared with 677,862,000 pounds in the like 1948 period.

Unfilled orders at the end of August totaled 26,071,000 pounds compared with 69,126,000 pounds at the end of August, 1948.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 17.62½c, Conn. Valley, Lake, 17.75c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 16.00-17.25c; 88-10-2 (No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 13.75-15.00c.

Zinc: Prime western 9.25-9.50c, brass special 9.50c, intermediate 9.75c, East St. Louis; high grade 10.25-10.50, delivered.

Lead: Common 12.80c; chemical 12.90c; corroding 12.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.25-17.00c; No. 12 foundry alloy (No. 2 grade) 15.50-16.25c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 17.50-17.75c; grade 2, 16.50-16.75c; grade 3, 15.50-15.75c; grade 4, 14.75-15.25c. Prices include freight at carload rate up to 75 cents per 100 lb. 5% titanium-aluminum alloy No. 1 (low Cu) 31.00c; No. 2 (2% Cu) 28.00c, f.o.b. Eddystone, Pa.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A tin, spot, 95.00c, New York; Straits, November arrival, 95.00c. Chinese, 99% tin, October, 87.00-88.00c; November arrival, 84.00-85.00c.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 95.00c; Grade B, 99.8% or higher, not meeting specs. for Grade A, with 0.05% max. arsenic, 94.80c; Grade C, 99.65-99.79%, incl., 94.40c; Grade D, 99.5-99.649%, 94.40c; Grade E, 99-99.499%, 94.00c; Grade F, 98-98.999%, 93.50c; Grade G, 95-97.999%, 91.00c. Prices for grade D through Grade G are for tin content.

Antimony: American 99-99.8% and over but not meeting specifications below, 32.00c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 32.50c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99% (Chinese, English, Belgium), prompt, 26.25c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $73-$75 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $69-72 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 16-cent copper.)

Sheet: Copper 31.30; yellow brass 28.19; commercial bronze, 95%, 31.28; 90%, 30.84; red brass, 85%, 29.89; 80%, 29.47; best quality, 29.01; nickel silver, 18%, 41.78; phosphor-bronze, grade A, 5%, 50.47.

Rods: Copper, hot-rolled 27.15; cold-drawn 28.40; yellow brass free cutting, 22.76; commercial bronze, 95% 30.97; 90% 30.53; red brass 85% 29.58; 80% 29.16.

Seamless Tubing: Copper 31.34, yellow brass 31.20; commercial bronze 90% 33.50; red brass 85% 32.80; 80% 32.38.

Wire: Yellow brass 28.48; commercial bronze, 95% 31.57; 90% 31.13; red brass, 85% 30.18; 80% 29.76; best quality brass 29.30.

Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.42½, l.c.l. 23.05, c.l. 22.55; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.693, l.c.l. 25.443, c.l. 24.943; magnet, delivered, c.l. 27.62½, 15,000 lb or more 27.87½, l.c.l. 28.37½.

ALUMINUM

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	—Hexagonal— R317-T4	—Hexagonal— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	37.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $18.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $18.00 per cwt. Traps and bends: List price plus 48%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 27.96c; oval 27.46c; cast 25.99c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.25c; over 250 lb, 24.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, 111.00c, 500 to 999 lb, 111.50c; 200 to 499 lb, 112.00c; less than 2090 lb, 113.50c; ball, 1000 lb and over, 113.25c; 500 to 999 lb, 113.75c; 200 to 499 lb. 114.25c; less than 200 lb, 115.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 67.9c; 100 or 300 lb drums only, 100 to 500 lb, 59.7c; 600 to 1900 lb, 57.3c; 2000 to 9900 lb, 55.5c, f.o.b. Sewaren, N. J. On 100 or 350 lb drums only, 100 to 600 lb 59.7c; 600 to 1900 lb, 57.3c; 2000 to 9900 lb, 55.5c; 10,000 lb and over, 54.4c, f.o.b. Carteret, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c, f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 96.00c; more than 2000 lb, 94.00c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 83.00c; 100 lb kegs 84.00c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	14.62½	14.62½	13.87½
Yellow brass	12.00	11.75	11.00
Commercial Bronze			
95%	13.62½	13.37½	12.87½
90%	13.50	13.25	12.75
Red brass			
85%	13.25	13.00	13.12½
80%	13.00	12.75	12.25
Best Quality (71-80%)	12.87½	12.62½	12.12½
Muntz Metal	11.12½	10.87½	10.37½
Nickel, silver, 10%	14.00	13.75	7.00
Phos. bronze, A	16.37½	16.12½	15.12½
Naval brass	11.62½	11.37½	10.87½
Manganese bronze	11.62½	11.37½	10.75

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 14.00-14.25; No. 2 copper 13.00; light copper 12.00; composition red brass 11.50-12.00; radiators 9.25-9.50; heavy yellow brass 8.75-9.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 14.50-14.75; No. 2 copper 13.50-13.75; light copper 12.50-12.75; composition red brass 12.00; radiators 9.25-9.50; heavy yellow brass 9.25-9.50.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and Brass: Heavy copper and wire No. 1 12.50-12.75; No. 2 11.50-11.75; light copper 10.50-10.75; No. 1 composition red brass 9.50-9.75; No. 1 composition turnings 9.00-9.25; mixed brass turnings 6.00-6.25; new brass clippings 10.00-10.50; No. 1 brass rod turnings 7.75-8.00; light brass 6.00-6.25; heavy yellow brass 6.50-6.75; new brass rod ends 7.75-8.00; auto radiators, unsweated 7.50-7.75; cocks and faucets, 7.75-8.00; brass pipe 8.50-8.75.

Lead: Heavy 9.50-9.75, battery plates 4.75-5.00; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.75-10.00.

Zinc: Old zinc 3.50-4.00, new die cast scrap 3.25-3.75, old die cast scrap 2.50.

Tin: No. 1 pewter 48.00-50.00, block tin pipe 70.00-72.00, No. 1 babbitt 36.00-38.00.

Aluminum: Clippings 2S 10.00-10.50, old sheets 7.00-7.50, crankcase 7.00-7.50, borings and turnings 3.00-3.50.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Oct. 27	17.625	12.80	9.25–50	95.00	17.00	32.00	40.00	73.25
Oct. 24-26	17.625	12.80	9.25	95.00	17.00	32.00	40.00	73.25
Oct. 18-22	17.625	12.80	9.25	95.750	17.00	32.00	40.00	73.25
Oct. 17	17.625	12.80	9.25	95.875	17.00	32.00	40.00	73.25
Oct. 14-15	17.625	12.85	9.25	95.875	17.00	32.00	40.00	73.25
Oct. 10-13	17.625	13.55	9.25	95.875	17.00	32.00	40.00	73.25
Oct. 7-8	17.625	13.60	9.25	95.875	17.00	32.00	40.00	73.25
Oct. 4-6	17.625	14.05	9.25	96.00	17.00	38.50	40.00	73.25
Oct. 3	17.625	14.10	9.25	96.00	17.00	38.50	40.00	73.25
Oct. 1	17.625	14.55	10.00	96.00	17.00	38.50	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del, New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Oct. 27, 1949; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Oct. 27	$26.67
Oct. 20	26.17
Sept. 1949	26.07
Oct. 1948	43.25
Oct. 1944	16.50

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$29.00
No. 2 Heavy Melt.	27.00
No. 1 Busheling	29.00
No. 1 Bundles	29.00
No. 2 Bundles	23.00-24.00
No. 3 Bundles	22.00-23.00
Heavy Turnings	22.50-23.50
Machine Shop Turnings	20.00†
Mixed Borings, Turnings	20.00†
Short Shovel Turnings	22.00
Cast Iron Borings	21.00*
Low Phos. Steel	31.00-32.00*

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
No. 1 Machinery Cast	39.00-40.00
Charging Box Cast	31.00-32.00*
Heavy Breakable Cast	28.00-29.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	31.00
Axles	35.00-36.00
Rails, Random Length	34.00-35.00
Rails, 2 ft and under	38.00-39.00
Rails, 18 in. and under	39.00-40.00
Railroad Specialties	32.00-33.00
Angles, Splice Bars	32.00-33.00

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	*$25.00-26.50†*
No. 2 Heavy Melt. Steel	*24.00-25.50†*
No. 1 Busheling	*25.00-26.50†*
No. 1 Bundles	*25.00-26.50†*
No. 2 Bundles	*22.00-23.50†*
Machine Shop Turnings	*15.00-17.00†*
Mixed Borings, Turnings	*17.00-19.00†*
Short Shovel Turnings	*17.00-19.00†*
Cast Iron Borings	*17.00-19.00†*
Bar Crops and Plate	*26.00-27.50†*
Punchings & Plate Scrap	*26.00-27.50†*
Cut Structurals	*27.00-29.50*

† Nominal.

Cast Iron Grades†

No. 1 Cupola	*42.00-43.00*
Charging Box Cast	*35.00-36.00*
Stove Plate	*37.00-38.00*
Heavy Breakable Cast	*33.00-34.00*
Unstripped Motor Blocks	30.50-31.50
Malleable	*36.50-37.50*
Brake Shoes	*31.00-32.00*
Clean Auto Cast	*44.00-45.00*
No. 1 Wheels	*35.00-36.00*
Burnt Cast	*32.00-33.00*

† Nominal.

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-33.00
R.R. Malleable	34.00-35.00
Rail, 3 ft and under	38.00-39.00
Rails, Random Lengths	32.00-33.00
Cast Steel	27.00-28.00
Railroad Specialties	31.00-32.00
Uncut Tires	30.50-31.00
Angles, Splice Bars	34.00-35.00

VALLEY

No. 1 Heavy Melt. Steel	*29.00-29.50*
No. 2 Heavy Melt. Steel	*28.00-28.50*
No. 1 Bundles	*29.00-29.50*
No. 2 Bundles	*25.00-25.50*
Machine Shop Turnings	19.00-20.00
Short Shovel Turnings	22.00-23.00
Cast Iron Borings	22.00-23.00
Low Phos.	*30.00-30.50*

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-33.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$23.50-24.50*
No. 2 Heavy Melt. Steel	22.00-22.50*
No. 1 Busheling	22.00-22.50*
No. 1 Bundles	23.50-24.50*
No. 2 Bundles	20.50-21.00*
Machine Shop Turnings	17.00
Short Shovel Turnings	18.00
Mixed Borings, Turnings	14.00-15.00
Bar Crop and Plate	26.00-27.00
Punchings & Plate Scrap	26.00-27.00
Cut Structurals	*25.00*
Elec. Furnace Bundles	*24.50*
Heavy Turnings	23.50-24.50
No. 1 Chemical Borings	26.00-27.00

Cast Iron Grades

No. 1 Cupola Cast	32.50
No. 1 Machinery Cast	36.00-37.00*
Charging Box Cast	*34.00-35.00*
Heavy Breakable Cast	*34.00-35.00*
Unstripped Motor Blocks	29.00-30.00
Clean Auto Cast	36.00-37.00*
No. 1 Wheels	35.00-36.00*
Malleable	32.00

* Nominal.

CINCINNATI

No. 1 Heavy Melt. Steel	$26.00
No. 2 Heavy Melt. Steel	22.00
No. 1 Busheling	26.00
No. 1 Bundles	26.00
No. 2 Bundles	20.00
Machine Shop Turnings	12.00
Short Shovel Turnings	15.00
Mixed Borings, Turnings	15.00
Cast Iron Borings	15.00

Cast Iron Grades

No. 1 Cupola Cast	41.00
Charging Box Cast	31.00
Heavy Breakable Cast	34.00
Stove Plate	30.00
Unstripped Motor Blocks	20.00
Brake Shoes	22.00
Clean Auto Cast	38.50
Drop Broken Cast	45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	27.00
R.R. Malleable	33.00
Rails, Rerolling	37.00
Rails, Random Lengths	35.00
Rails, 18 in. and under	44.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	*$18.00-19.00*
No. 1 Bundles	*21.00-22.00*
No. 2 Bundles	17.00-18.00
No. 1 Busheling	*21.00-22.00*
Machine Shop Turnings	*13.00-14.00*
Mixed Borings, Turnings	*13.00-14.00*
Short Shovel Turnings	*15.00-16.00*
Cast Iron Borings	*15.00-16.00*
Punchings & Plate Scrap	*21.00-22.00*

Cast Iron Grades

No. 1 Cupola Cast	32.00-33.00
Heavy Breakable Cast	28.00-29.00
Clean Auto Cast	32.00-33.00

BUFFALO

No. 1 Heavy Melt. Steel	$27.00-27.50
No. 2 Heavy Melt. Steel	24.50-25.00
No. 1 Bushelings	24.50-25.00
No. 1 Bundles	25.50-26.00
No. 2 Bundles	23.00-23.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	20.50-21.00
Low Phos.	28.50-29.00

Cast Iron Grades

No. 1 Cupola	37.00-37.50
No. 1 Machinery	38.00-38.50
Mixed Yard	35.50-36.00
Malleable	34.50-35.00

Railroad Scrap

Rails, 3 ft. and under	35.00-36.00
Scrap rails	30.00-31.00
Specialties	31.00-32.00
No. 1 car wheels	32.00-33.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	17.00
No. 1 Busheling	15.00-16.00
No. 1 Bundles	18.00-18.50
No. 2 Bundles	14.00-15.00
No. 3 Bundles	nominal
Machine Shop Turnings	10.00-11.00
Mixed Borings, Turnings	10.00-11.00
Short Shovel Turnings	11.00-12.00
Punchings & Plate Scrap	22.00-23.00
Cut Structurals	22.00-23.00
Elec. Furnace Bundles	19.00-20.00

Cast Iron Grades

No. 1 Cupola Cast	*29.00-30.00*
No. 1 Machinery	*31.00-32.00*
Charging Box Cast	25.00-26.00
Heavy Breakable	25.00-26.00
Unstripped Motor Blocks	26.00
Malleable	32.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$17.50-18.00
No. 2 Heavy Melt. Steel	16.00-16.50
No. 1 Bundles	17.00-18.00
No. 1 Busheling	14.00-15.00
Machine Shop Turnings	9.00-10.00
Mixed Borings, Turnings	9.00-9.50
Short Shovel Turnings	11.00-12.00
Bar Crops and Plate	19.00-20.00
Punchings & Plate Scrap	19.00-20.00
Chemical Borings	18.00-19.00

Cast Iron Grade

No. 1 Cupola Cast	30.00-31.00
Mixed Cast	27.00-28.00
Heavy Breakable Cast	28.00-29.00
Stove Plate	22.00-23.00
Unstripped Motor Blocks	20.00-21.00

CHICAGO

No. 1 Heavy Melt. Steel	*$27.00-28.00**
No. 2 Heavy Melt. Steel	*26.00-27.00**
No. 1 Bundles	*27.00-28.00**
No. 2 Bundles	*24.00-25.00**
No. 3 Bundles	16.00-17.00
Machine Shop Turnings	19.00-20.00
Mixed Borings, Turnings	19.00-20.00
Short Shovel Turnings	20.00-21.00
Cast Iron Borings	19.00-20.00
Bar Crops and Plate	29.00-31.00
Punchings	29.00-31.00
Elec. Furnace Bundles	*27.00-28.00**
Heavy Turnings	23.00-24.00
Cut Structurals	*28.00-29.00**

Cast Iron Grades

No. 1 Cupola Cast	41.00-42.00
Clean Auto Cast	41.00-42.00
No. 1 Wheels	33.00-34.00
Stove Plate	33.00-34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	31.00-32.00
Malleable	37.00-38.00
Rails, Rerolling	41.00-42.00
Rails, Random Lengths	40.00-41.00
Rails, 2 ft. and under	41.00-42.00
Rails, 18 in. and under	42.00-43.00
Railroad Specialties	33.00-34.00
Angles, Splice Bars	35.50-36.50

* Nominal.

ST. LOUIS

No. 1 Heavy Melt. Steel	$28.00-29.00
No. 2 Heavy Melt. Steel	25.00-26.00
Machine Shop Turnings	20.00-21.00
Short Shovel Turnings	21.00-22.00

Cast Iron Grades

No. 1 Cupola Cast	36.00-38.00
Charging Box Cast	34.00-35.00
Heavy Breakable Cast	32.00-33.00
Brake Shoes	*32.00-33.00*
Clean Auto Cast	40.00-42.00
Burnt Cast	*32.00-33.00*

Railroad Scrap

R.R. Malleable	31.00-32.00
Rails, Rerolling	*39.00-40.00*
Rails, Random Lengths	*33.00-34.00*
Rails, 3 ft. and under	36.00-38.00
Uncut Tires	28.00-29.00
Angles, Splice Bars	33.00-35.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	24.50
No. 1 Busheling	24.00
No. 2 Bundles	22.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Short Shovel Turnings	19.00
Cast Iron Borings	18.00
Bar Crops and Plate	30.00
Cut Structurals	23.00

Cast Iron Grades

No. 1 Cupola Cast	34.00-35.00
Stove Plate	28.00-30.00
No. 1 Wheels	23.00-24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.00
R. R. Malleable	nominal
Rails, Rerolling	*37.00*
Rails 3 ft. and under	25.00-26.00
Angles and Splice Bars	31.00-33.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$17.00
No. 2 Heavy Melt. Steel	15.00
Nos. 1 & 2 Bundles	13.00

Cast Iron Grades

No. 1 Cupola Cast	23.00-25.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	17.00
Wheels	17.00
Rails, Random Lengths	17.00

SEATTLE

No. 1 Heavy Melt. Steel	$16.00
No. 2 Heavy Melt. Steel	16.00
No. 1 Busheling	13.50
Nos. 1 & 2 Bundles	14.00
No. 3 Bundles	nom.
Machine Shop Turnings	11.00
Mixed Borings, Turnings	11.00
Punchings & Plate Scrap	22.00
Cut Structurals	22.00
Elec. Furnace Bundles	23.00

Cast Iron Grades

No. 1 Cupola Cast	25.00-27.50
Heavy Breakable Cast	17.00
Stove Plate	17.00
Unstripped Motor Blocks	17.00
Malleable	20.00
Brake Shoes	17.00-18.00
Clean Auto Cast	23.00
No. 1 Wheels	22.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	17.00
Railroad Malleable	22.00
Rails, Random Lengths	17.00
Angles and Splice Bars	17.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	12.00
Mixed Borings, Turnings	12.00
Punchings & Plate Scrap	24.00
Electric Furnace Bundles	26.00

Cast Iron Grades

No. 1 Cupola Cast	$30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	25.00

HAMILTON, ONT.

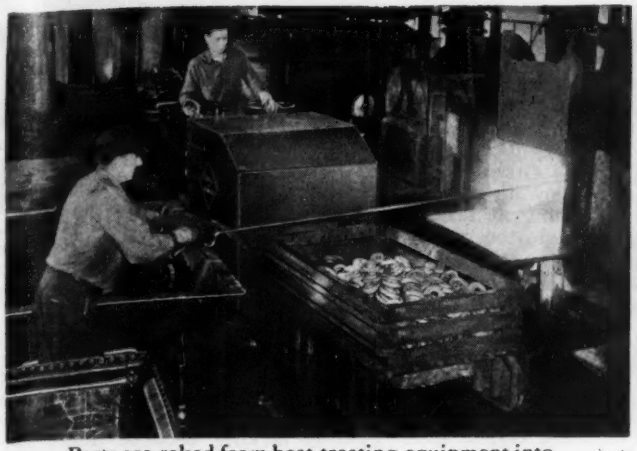
(Delivered prices)

Heavy Melt.	*$24.00*
No. 1 Bundles	*24.00*
Mechanical Bundles	*22.00*
Mixed Steel Scrap	*20.00*
Mixed Borings, Turnings	*18.00*
Rails, Remelting	*24.00*
Rails, Rerolling	*27.00*
Busheling	*18.00*
Bushelings new factory, prep'd	*22.00*
Bushelings new factory, unprep'd	*17.00*
Short Steel Turnings	*18.00*

Cast Iron Grades*

Cast	*40.00-43.00*

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.



Parts are raked from heat-treating equipment into skid box on truck, then removed for cooling.

Truck platform enters annealing oven to deposit or remove loads. Truck works quickly to save gas or oil.

IN INDUSTRY'S

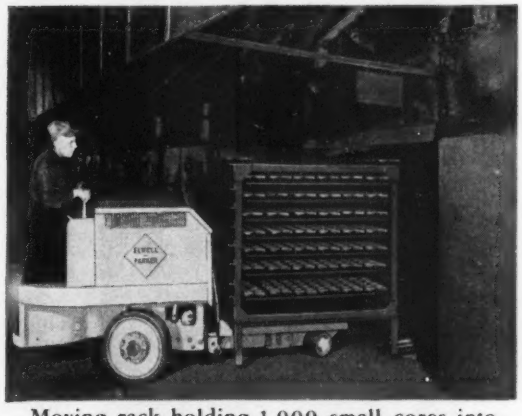
HOT SPOTS

ELWELL-PARKERS

Prove Their Mettle!

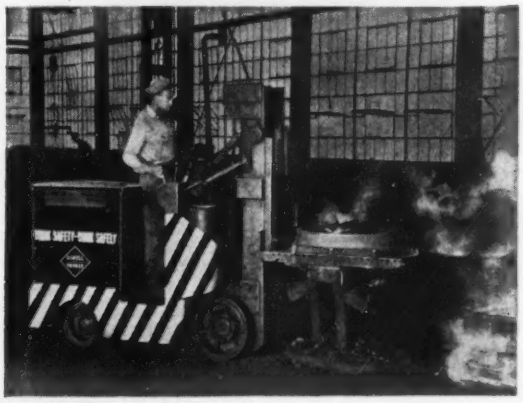
Pouring metal into bucket on truck, which then quickly carries load to foundry floor.

Working with metals at high temperatures is truly the No. 1 proving ground for industrial trucks. For over 30 years, Elwell-Parkers have operated on such work with safety, ease of control, and remarkable dependability. They readily handle jobs that are impossible manually. E-P Trucks also operate at speeds permitting synchronization of operations—so important with molten metals. Elwell-Parker electric trucks operate all over the plant, and they are assigned the toughest trucking jobs, because they always prove equal to them. The Elwell-Parker Electric Company, 4501 St. Clair Avenue, Cleveland 3, Ohio.



Moving rack holding 1,000 small cores into oven. Truck keeps ovens operating continuously.

FREE BOOKLET
on Handling of Hot Metals.
Ask for E-P Reporter No. 7.



E-P Electric Truck removing hot railway car wheels from foundry to cooling department.

ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

Sheets Strip . . .

Sheet and Strip Prices, Page 85 & 86 & 87

New York—If all sheet mills now closed were to come back into operation at once, none would be able to accept tonnage for shipment before end of the year on any grade, with exception of stainless sheets and possibly one or two other specialties. Most, but not all, producers are accepting orders on major grades for delivery at earliest convenience and are confining orders to regular customers. Most producers are trying to duck specifications rather than build up new backlogs as was the case early last summer. There is little rhyme or reason to future schedules. Certain mills, even including at least one which is now in operation, have not as yet officially opened their books for first quarter, but they are the exception.

Boston—If not already short of sheets, consumers eventually will be pinched by the growing scarcity. While tonnage on mills when the strike began will be given first consideration, considerable volume will not be shipped until early 1950. Cold-rolled and galvanized sheets are most extended. Bookings have slackened due to reluctance on part of some mills to further clog order books beyond January. Ahead is another period of confusion, delayed deliveries, shortages and pressure for tonnage. Because cold strip output continues at most mills, supply situation is less acute, but producers are beginning to adjust rollings to meet hot strip reserves.

Pittsburgh—Mill order backlogs of sheets and strip are expected to be substantially extended by the time the strike is ended.

Deliveries on galvanized and cold-rolled sheets already are booked four months ahead in some instances; enameling stock, three months; hot-rolled sheets and silicon sheets, slightly over two months. Producers are expected to reinstate allotments of flat-rolled steel to district offices when the strike is terminated. There is no assurance mill production schedules will be maintained at practical capacity once pipelines are filled. In fact, many interests are pessimistic in their demand forecasts. This view is based on belief current strike has seriously checked the moderate improvement in general business conditions that got under way early in July.

Supply of stainless steel will receive another serious blow if the threatened strike at Allegheny Ludlum Steel Corp.'s plants materialize on Nov. 1.

Philadelphia — Cold-rolled sheets continue under heavy demand, with buyers ordering ahead as far as possible. Mills are moving conservatively, accepting tonnages only from their regular customers for shipment in the first quarter. One mill, which is still in operation, has not opened its books for even that quarter. A district producer of hot-rolled sheets, which has continued in operation, is sold up until the end of the year and is now out of the market. Stainless steel sheets and certain other specialties can be had for delivery over the next few weeks.

Cleveland—Imposing order accumulations are building up on books of sheet and strip producers for delivery into first quarter of next year. Republic Steel Corp. is booked through the remainder of this year and is accepting tonnage from regular customers for first quarter. Other sellers, in the main, are following much the same policy. Rationing at least of an informal sort is expected once production is resumed since it now appears the mills may be unable to deliver all tonnage on schedule, necessitating shifts in delivery dates.

Cincinnati—Sheet producers still operating are under heavy pressure for prompt deliveries. There have been no cancellations due to consumer shortages of other types of steel or other requirements affected by strikes. Books for first quarter, excepting on some specialties, have not yet been opened, although requests for delivery positions are abundant. Forward buying has not reached a vigorous stage and the hesitancy is attributed to uncertainty as to ultimate effect of current labor troubles on general business.

Chicago—Users do not expect to be able to get newly ordered sheet or strip until after the first of the year. Inventories are rapidly dwindling. Mill operations, when started, will take possibly six weeks or more to turn out a normal month's production of steel. Consumers say curtailments, if they don't come before the strike is over, are certain to come afterwards and will cut almost as deeply as they would if the strike were still on. Hot-rolled material is reaching approximately the same stringent position as cold-rolled. Galvanized material is unobtainable.

Birmingham — Consumers' inventories of strip are being reduced rapidly and sharp curtailment in their operations will be necessary if the flow of fresh supplies is not augmented soon. Connors Steel Co., this city, and Atlantic Steel Co., Atlanta, are operating at capacity, but unable to meet the district's demands fully.

Los Angeles—Inventory position of sheet users is becoming precarious. Although there have been no major shutdowns in this district, several automobile assembly plants have shortened their work week to 4 days, and other consumers are expected to follow. The two cold-rolled strip mills that are in operation are able to meet needs of most of their regular customers, but can supply little tonnage for other buyers. Strike-bound mills generally are not soliciting "if and when" orders, and are accepting bookings from regular customers without delivery commitments. Some form of allocations is expected when the shutdown ends. Kaiser's Fontana mill is booking in January and February for most products, with plate and pipe on allocation, and sheet, cold-rolled strip and merchant bars likely to go on semiallocation shortly.

San Francisco—Pressure for sheets is mounting as supplies dwindle. Although no shutdowns have been reported because of lack of supplies, the full pinch of a shortage in flat-rolled items will begin to be felt by mid-November. Galvanized stock is virtually gone.

Plates . . .

Plate Prices, Page 85

New York—District plate fabricating shops are beginning to feel the squeeze of the steel strike. Few that have work ahead have been forced to suspend entirely, but stocks are becoming further unbalanced and rate of output is lessening. In some instances, shifts have been reduced and some shopmen are slowing up a bit in an effort to extend work as long as possible.

With only two plate mills operating in the East, pressure on these producers is increasingly strong, but they are still able to accept tonnage for shipment this year. Severe pressure is lacking because major consuming industries, including railroads, oil and gas industries and shipyards, remain quiet.

Export demand for plates has dried up temporarily, due to the steel strike, dollar shortages abroad and various currency devaluations.

Boston—Fabricating shops' plate inventories are getting low in some instances and costs are higher since more warehouse tonnage is employed. Tank builders are not able to quote firm delivery on new orders, the volume of which is smaller. Some projects requiring specific volume are confronted with delay. Large diameter steel pipe porjects are involved. Shipyards are lowering inventory, but are not yet seriously affected by shortages.

Philadelphia—Plate buying continues far from active. Some mills, down because of the strike, report that if they were to resume immediately they could get out tonnage against new orders within three weeks. Meanwhile, the two district mills which continue in operation, are still able to accept tonnage for shipment before end of the year. The only really active spot in demand for plates is for light fuel oil tanks. Ordering by jobbers is somewhat better. One district railroad has so much excess tonnage on hand that it has offered to sell plates to other railroads at cost.

Cleveland—Somewhat slower demand for plates is noted here with manufacturing plants beginning to curtail operations due to unbalanced inventories or "hold" orders. Some gray market tonnage is being offered. An eastern seller has been seeking to dispose of one lot at about 1 cent over the regular market. Several lots of so-called manufacturers' "excess" tonnage also are being actively offered.

Los Angeles—Supplies of heavy plate are fairly good, with Kaiser continuing to produce, and with fabricators and jobbers generally well supplied at inception of the strike. Supplies of light plate, 10 and 12-gage, which is not locally produced, are tight. This type is widely used by fabricators of bolted tanks for oil fields, and they are feeling the pinch. One firm took orders on every such tank it had material for within 24 hours after the steel shutdown.

Seattle—Largest plate project immediately pending is the Lucky Peak dam in Idaho, requiring 900 tons. Plate fabricators report new business confined to small tonnages.

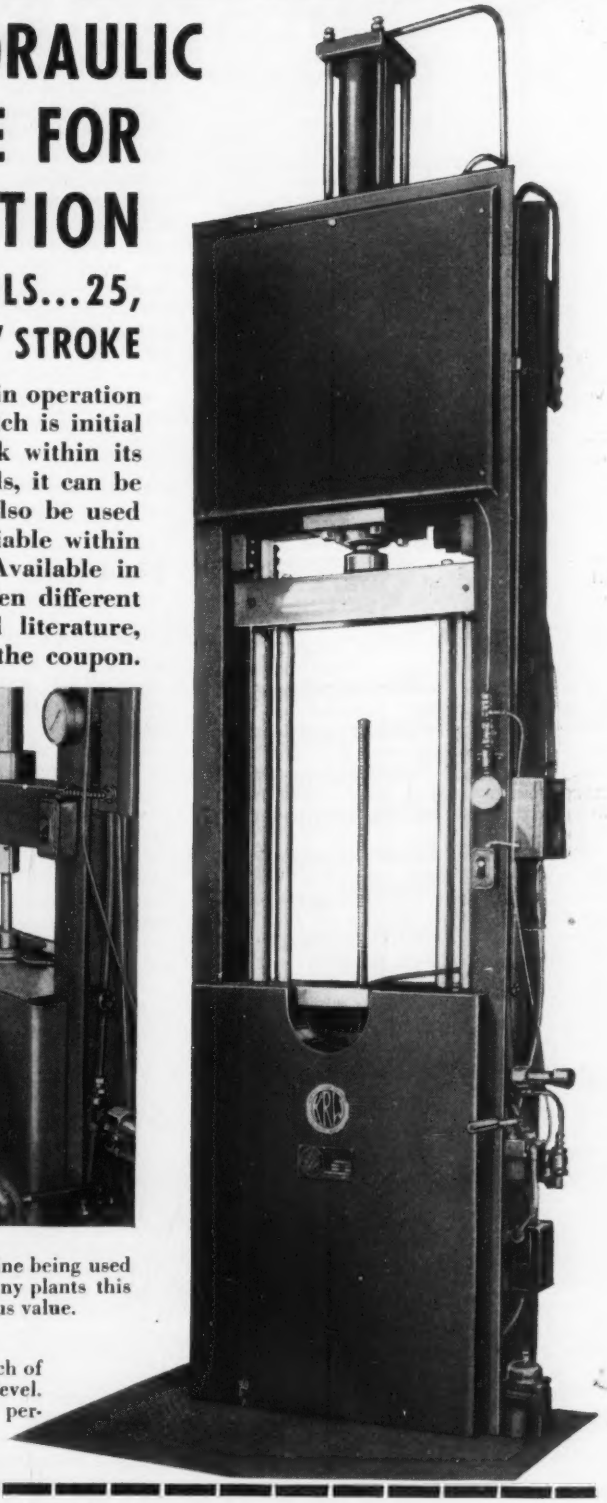
KRW ANNOUNCES

A NEW, LOW-COST HYDRAULIC BROACHING MACHINE FOR "PUSH-PULL" OPERATION

VERTICAL OR HORIZONTAL MODELS...25, 50, 60-TON CAPACITIES, UP TO 48" STROKE

You have to see this new KRW Broaching Machine in operation to appreciate its many features not the least of which is initial cost. This broaching machine will handle any work within its stroke and working capacity. In a matter of seconds, it can be changed from "Push" to "Pull" operation. It can also be used as a press. Pressures and stroke are infinitely variable within rated capacity. Electrical controls are standard. Available in either vertical or horizontal models. Choice of Ten different hydraulic pump combinations. Write for detailed literature, specifications and prices of standard models. Use the coupon.

The KRW Broaching Machine being used as a hydraulic press. In many plants this feature is a definite plus value.



All controls within convenient reach of the operator. Pressure gauge at eye level. Manually operated four-way valve permits instant and precise finger-tip control of ram. Every control readily accessible.

K·R·WILSON

215 MAIN ST. · BUFFALO 3, N. Y.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please send information on KRW Hydraulic Broaching Machine. Capacity Req. 25 Ton ☐ 50 Ton ☐ 60 Ton ☐

Name_____

Address_____

City & Zone_____ State_____

82

Steel Bars . . .

Bar Prices, Page 85

Pittsburgh—The few cold-finished bar producers not idled by the steel strike are expected to terminate operations by Nov. 1, due to depleted stocks of hot-rolled material. Some cold finishers estimate it will require nearly three weeks after mills resume operations before hot-rolled inventories will be adequate to reopen plants. This situation will not apply to those cold finishers struck Oct. 1 because their stocks of hot-rolled material were equivalent to three to four weeks' needs in most instances. Due to the favorable supply-demand relationship of carbon and alloy cold-finished bar items prior to the strike, customers' stocks were somewhat larger than those of flat-rolled products. Cold finishers are concerned over lack of interest among customers to get on mill production schedules because of the probability that delivery promises will be much further extended soon after termination of the strike.

New York—Some leading carbon bar sellers and most producers of hot alloy bars can offer large sized bars for December delivery, if they are able to get their mills back in operation by Nov. 1.

Deliveries on hot carbon bars in the small and medium sizes can not be made this year, insofar as new orders are concerned. Some leading sellers are booked well into the first quarter and are hesitating to accept more tonnage until they know more definitely what the outlook is going to be.

Cold-finished bars are in fairly good supply. With some important exceptions, most cold drawers are in operation, although stocks of hot material are becoming increasingly unbalanced and their finished bar inventories are beginning to dwindle. Consumers are able to obtain most sizes for shipment within a few weeks by shopping around.

Boston—Carbon and alloy bar consumers are beginning to run short of certain sizes and grades and are filling in needs from warehouse. Stocks of bars, notably cold-finished, held by larger users are substantial for current operations, but some forward protective buying for future delivery has developed. Mild improvement in finished products fabricated from bars has held.

Cleveland—Despite slackening in manufacturing generally because of unbalanced steel inventories and order cancellations, hot carbon bar sellers here are in receipt of substantial new business. Deliveries depend on the length of the strike. but it looks as though some tonnage accepted for fourth quarter will carry over into first quarter. This backing up may result in a much tighter supply situation than prevailed pre-strike. Cold-finished bar demand also is improved though activity in this product is less marked than in hot carbon bars. Some warehouses that had been virtually out of the market for months are entering tonnage and consumers are displaying increasing interest in replenishing inventories.

Philadelphia—Mill salesmen declare that demand for hot carbon bars is far from active. If nearby deliveries were possible, the situation would be different, but there is a generally declining interest in future commitments. Many consumers have ordered into the first quarter and prefer to await developments before ordering additional tonnage. District cold drawers can offer most sizes of bars for shipment within two to three weeks, where hot material is in stock. They still have a fairly diversified inventory.

Birmingham—The two producers still operating in the southeast are scheduling their bar mills at capacity, but their combined output is not sufficient to meet the pressing demands of consumers in this area. Consumers are operating largely on pre-strike inventories and are beginning to curtail operations to conserve their dwindling supplies.

San Francisco—Continued production of bars by Fontana, Judson Steel and Pacific States Steel, plus substantial inventories in this area, indicates bar supply will be fair for the next two months.

Tin Plate . . .

Tin Plate Prices, Page 86

Pittsburgh—Dwindling tin plate inventories among major can companies likely will force curtailment in production early next month. At start of the steel strike, can companies had about 30 to 40 days' supply of tin plate and these stocks have been supplemented by continued operation at Weirton and Granite City. Mill order volume during the strike period has been below that recorded throughout September, although some relatively large individual company commitments have been booked for scheduling as soon as possible after the strike. Mills contend it will take nearly four weeks to complete shipments on old commitments after full mill production schedules are resumed.

Structural Shapes . . .

Structural Shape Prices, Page 85

New York—Structural bookings increased to 118,187 tons in September from the revised total of 98,406 tons in August. The 9-month total of 1,043,168 tons lagged some 30 per cent behind the 1,492,683 tons for the like 1948 period, reports American Institute of Steel Construction Inc.

Shipments last month of 151,346 tons compared with revised figures for August and July of 182,416 and 145,313 tons, respectively. Total shipments for the first nine months were 1,486,152 tons against 1,477,712 tons in the corresponding period last year and 1,074,145 tons for the average nine-month period for 1936-1940, inclusive.

Tonnage available for fabrication for the next four months, as of Oct. 1, was 562,211 tons against 698,230 tons a year ago and compared with 362,278 tons which represented the average for that date for the five prewar years.

Boston — Structural fabricating shops' order backlogs are slimmer and they are receiving a smaller volume of business for estimates. By filling in from warehouse, shops are making up some ground lost during recent strikes at fabricating plants. During that period, plain material was taken in without interruption and most shops had substantial stocks Oct. 1.

Philadelphia—Structural activity is light. No important awards are noted nor is there much in the way of inquiry. This lull may not be of any special significance, apart possibly from the advancing season. Phoenixville, Pa., shape maker is expected to start rolling within a week, after a slight delay.

Chicago—Fabricators have stepped up their trading activities, and cooperative effort along this line is probably at a high point. Various sizes, differing with individual companies, have now run short. Instances are known where construction has come to a halt for lack of steel, but this is not yet common. Mills, which are struck, are unable to give fabricators the word on what sizes will come first in the post-strike rollings. This probably will prevent some concerns from definitely committing themselves to jobs until they know with more certainty where they stand, deliverywise, after the strike's settlement.

Los Angeles—With ending of the strike of 500 sand and gravel equipment operators, work has been resumed on major construction projects. Structurals are virtually the only steel product currently in ample supply in this district, with a number of fabricating shops remaining in operation. Building activity continues strong in Los Angeles County, the total valuation of $65,369,674 in permits for September showing a $5 million increase over August. Plans are being completed for the new Statler Hotel in Los Angeles, and contracts will be awarded in January for a 13-story structure containing 1320 rooms.

San Francisco—With the exception of prospective shortages of specialized materials, structural fabricators have fairly good supplies. No real distress likely will be felt until December. Continued production by four West Coast steel mills, two of them in the San Francisco area, will help relieve some scarcities.

Seattle—Structural fabricators report fair demand for small tonnages. Inventories are down and may be exhausted within six weeks if Eastern mill operations are not resumed soon.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 85

Seattle—New business is not being accepted by Bethlehem Pacific Coast Steel Corp., due to the uncertain labor situation. This plant, the largest producer in this area, is idle. The two independents Northwest Steel Rolling Mills Inc., Seattle, and Oregon Steel Mills, Portland, Oreg., are operating at near capacity.

Bar order backlogs are fair and considerable business in small tonnages is available. Some orders calling for prompt delivery have been diverted. No projects involving large tonnages of reinforcing bars are pending.

Lasting Fastening

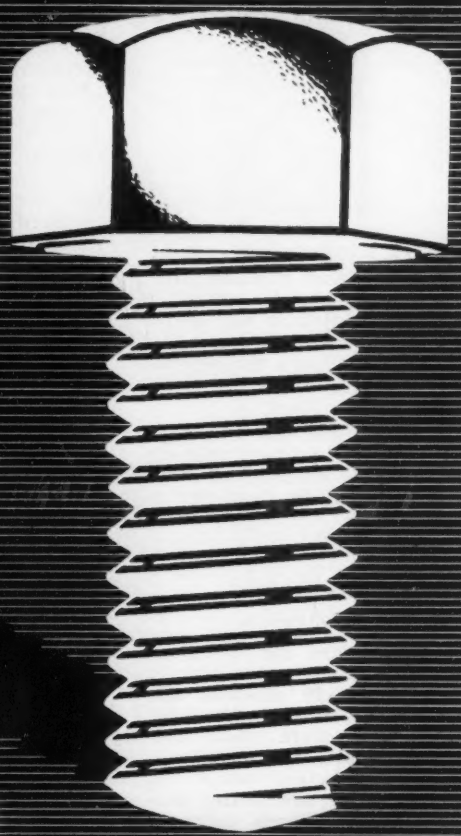
...every time with

REPUBLIC

UPSON

BRIGHT CAP SCREWS

AND SEMI-FINISHED NUTS



There's no question about lasting fastening when you specify REPUBLIC Bright Cap Screws and Semi-Finished Nuts. Like all products in Republic's *full line* of more than 20,000 different headed and threaded items, they are consistently uniform . . . always accurate. Republic Steel Corporation . . . Bolt and Nut Division, Cleveland, Ohio and Gadsden, Ala. . . . Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC STEEL
REG. U. S. PAT. OFF.

Tubular Goods . . .

Tubular Goods Prices, Page 88

Beaver Falls, Pa.—Babcock & Wilcox Tube Co. has issued price sheets for minimum wall, seamless, carbon steel merchant boiler tubes. The price sheets cover cold-drawn tubes in sizes 1 in. and 1¼ in. outside diameter and hot-finished tubes in sizes 1¼ in. through 6 in. outside diameter, in various wall thicknesses, with cut lengths 4 ft to 24 ft, inclusive, and in all quantity brackets. The price lists are for convenience of customers and do not represent adjustments in quotations.

Los Angeles—Pipe in diameters over 3 in. is becoming extremely tight. Many tubular items in smaller diameters have been in short supply for months. Some petroleum producers were admittedly doing precautionary buying of steel products prior to the strike, but others have been caught short. Tank needs in some instances are pressing.

San Francisco—Large pipeline projects will be hardest hit by the steel strike. Major shops which have been fabricating large diameter pipe are closed and pipe on hand for several lines is sufficient for only a few more weeks' needs.

Seattle—Inquiry for cast iron pipe is limited and no important projects are up for figures. Some small shipments are being made from inventory.

Pig Iron . . .

Pig Iron Prices, Page 84

Cleveland—Pressure for merchant pig iron is lacking with district foundries comfortably stocked and many receiving an increasing number of "hold" orders from their customers. Fabricators, having difficulty maintaining balanced component and steel inventories, are cutting production schedules. These cutbacks are backing up on castings suppliers and expectations are foundry operations will be severely curtailed within two weeks unless the steel strike is settled before then.

Philadelphia—Movement of pig iron is largely in the foundry grades, with volume in these grades fairly sustained. Despite the fact that only two furnaces are operating in this district, there are indications that some foundries are accumulating a little stock, which may cushion demand for iron once normal production is resumed. Orders for off-grade Dutch iron, totaling 7000 tons, have been placed in this district.

New York—Most district foundries are pressing less actively for pig iron. The recent upswing in foundry operations has leveled off as end-use requirements are less numerous because of increasing dislocation of schedules in metalworking industries. Considerable foreign iron is being offered here, but few sales are reported. General feeling prevails that the labor situation will be adjusted before deliveries from abroad can be made.

Three furnaces continue in operation along the seaboard. In addition, the North Tonawanda, N. Y., furnace has resumed, although most, if not all, of the iron is scheduled for the plants of its affiliated company, the American Radiator & Standard Sanitary Corp.

Pittsburgh — Amount of foundry oven coke being shipped into this district is far below requirements and is expected to force sharp curtailment in foundry operations by mid-November unless the coal strike is terminated.

Buffalo—Coke shipped in by an eastern source has aided some melters in this area. However, dwindling coke supplies are a serious threat to foundry operations. While foundries report iron supplies are shrinking, production has not been cut appreciably. The Tonawanda furnace, which was relighted a week ago, is helping to check any appreciable drop in production. Iron demand is tapering as result of the steel strike.

St. Louis—Pig iron demand soared last week as out-of-state steel mills, deprived by the strike of iron from their usual suppliers, called on this district for fill-ins. It is regarded as the last spurt before a slowdown, if the steel walkout continues. Users are feeling the iron pinch seriously and will reduce or halt operations in another 10 to 12 days. Some foundries are equally hard pressed for coke. Koppers Co. is obtaining a little coke from its St. Paul plant to tide over local iron customers. Koppers' ground stock of iron has dropped 50 per cent since the strike began, but nevertheless is ample at the present rate of sale for another two or three months.

Cincinnati—Pig iron in adequate supply is coming into this district to sustain foundry operations, but imminent shortage of coke may stifle production. Melters' backlogs are being cut due to customer hesitancy in making commitments.

Iron Ore . . .

Iron Ore Prices, Page 88

Cleveland — Only 79,830 tons of Lake Superior iron ore were shipped from upper lake ports during the week ended Oct. 24, reports Lake Superior Iron Ore Association. This compares with 2,011,646 tons for the like week a year ago. The cumulative total for the season to Oct. 24 is 68,213,203 tons compared with 72,719,328 tons for the like period a year ago. Shipments from United States ports alone have totaled only 66,717,178 so far this year, a decrease of 5,017,214 tons from a year ago.

Wire . . .

Wire Prices, Pages 86 & 87

Chicago—Distributors' nail inventories are suffering the largest inroads at present. Pressure for wire generally is not notably pronounced, so many other steel products being seriously depleted as to remove still operating wire makers from the full impact of the strike. Thus, all customers of now struck mills have not tried to place orders with operating mills as has been more widely true for other short steel products. Merchant items, such as fence, steel posts, etc., remain in fairly good supply in the field.

Alloy Steel . . .

Pittsburgh—Braeburn Alloy Steel Corp. and Colonial Steel Co. have been idled by the steelworkers union. Allegheny Ludlum Steel Corp.'s contract is due to expire Nov. 1. However, Firth-Sterling Steel & Carbide Corp., Vanadium-Alloys Steel Co., Anchor Drawn Steel Co., Jessop Steel Co. and Latrobe Electric Steel Co. remain in operation. No marked improvement in order volume is noted by these latter interests, probably because of an anticipated curtailment in production schedules among customers due to steadily dwindling steel inventories.

Warehouse . . .

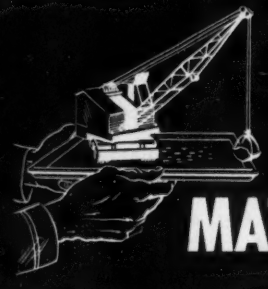
Warehouse Prices, Page 89

Chicago—Little flat-rolled and hot carbon bar stock is available from jobbers. Demand has accelerated for cold-finished bars and stainless, both being used increasingly as substitution material. Pressure by warehouses on the still operating mills is enormous, but no relief from this direction is in prospect. Mass curtailments have been avoided through swaps, loans of steel and usage of every possible scrap. Full scale mill operations for a prolonged period will be required to fill emptied supply lines. Warehouses, by the time the strike is settled, expect to have to start from scratch to rebuild stocks before they can take care of customers on a normal basis.

Boston—Demand for steel from warehouse is strong, notably for cold-rolled and galvanized sheets. Stocks of these grades are low. Distributors are more conservative in taking orders and in effect are allocating supplies. As inventories become depleted and unbalanced, warehouses are uncertain as to replenishment. Some had rather limited orders on books when their mills suspended shipments.

Philadelphia—Strong demand for prompt tonnage is reflected in widening gaps in warehouse stocks. Popular sizes of bars and light angles and certain gages of sheets are being depleted rapidly. Many buyers are buying off-sizes and grades as substitutes. Various jobbers who had substantial tonnages on hand when the steel strike began are beginning to show concern over replacements. Some look for fairly prompt shipments once the strike is ended on the theory that at least some tonnage had been rolled against old orders at the time mills were forced to suspend. They fear such would be little more than a stopgap and that considerable time may elapse before they will be able to get inventories back to normal. Despite current pressure, some leading distributors believe there is not quite the demand there was a couple of weeks ago.

Pittsburgh—An increase of 5 cents per 100 lb for city delivery will be put into effect Nov. 1 by warehouses in this area, making the differential 20 cents over the country price. The



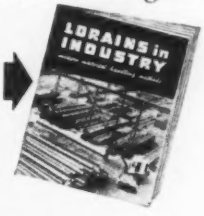
CURB SERVICE for scattered MATERIAL HANDLING JOBS

CLEANING out coke quenching pits is just one of many scattered material handling jobs arising daily at this large steel plant—and ready to offer instant curb service is this Lorain TL-20 Moto-Crane.

Traveling on a 6-wheel rubber-tire mounting at speeds up to 30 M.P.H., this unit can "highball" to any part of the yard in a matter of minutes. And it's a crane of many uses. A quick change to any one of more than 15 crane attachments enables the TL-20 to handle a wide variety of jobs in the fastest and safest manner.

Mobile Lorain "cranepower" brings you a maximum return on your investment because it is available for the jobs that last minutes as well as those that last hours or days. It's a "roving labor gang" unaffected by long hours, heat or cold.

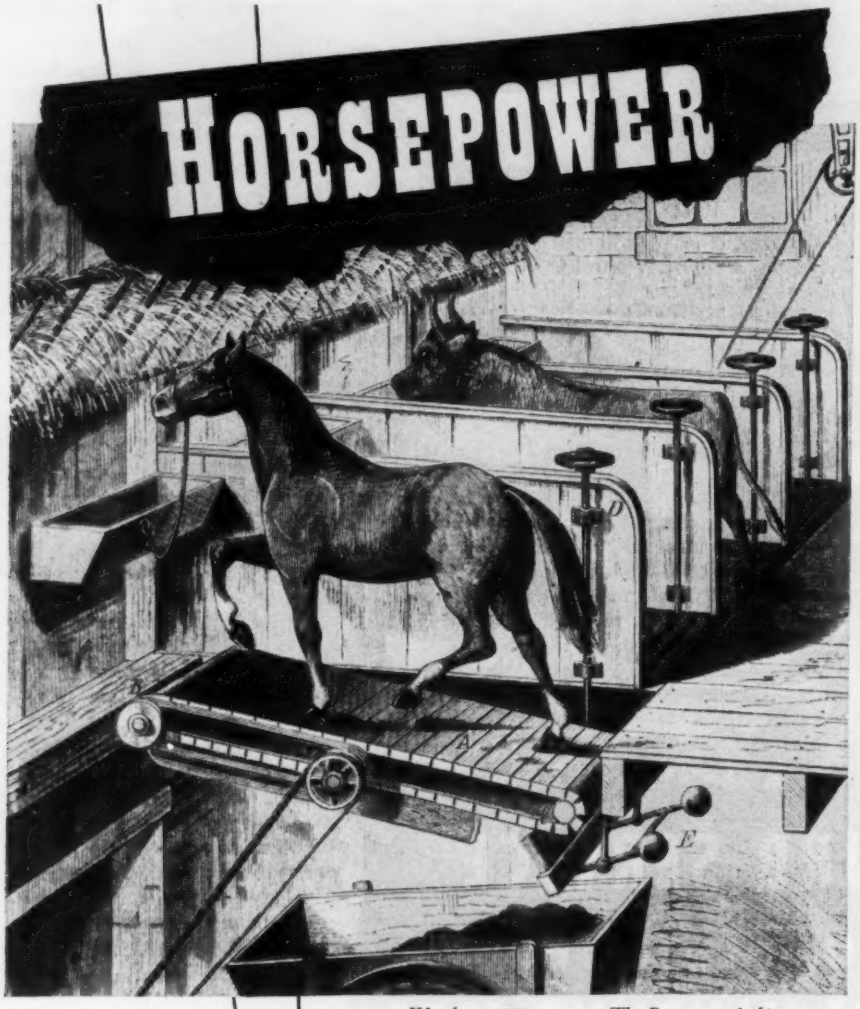
Lorain rubber-tire cranes are available in both single-engine self-propelled and two-engine Moto-Crane types. If you prefer, crawler mounting is readily substituted. Call your local Thew-Lorain distributor for complete information today—and remember to ask for a copy of the new bulletin, "Lorains In Industry."



thew-Lorain®

THE THEW SHOVEL CO.
LORAIN, OHIO

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES



Woodcut, 1880, courtesy The Bettmann Archive

Inventor Crawford claimed: "By this device a horse can clean his own stable, cut his own feed, run a thrasher, fanning mill, corn sheller, or corn mill, churn, saw or pump, wash buggies, clean windows, or wet down lawns, water stock, and put out fires."

History is full of examples of the literal application of *horsepower* to problems of power transmission, many of which were entirely impractical. Twin Disc has devoted 31 years to a program of continuous research and development in the field of power transmission. Today there is a Twin Disc product that is the *practical* answer for every job where power must be applied . . . in all types of construction, lumber, petroleum and farm equipment and in the marine and machine tool fields.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
(Hydraulic Division, Rockford, Illinois).

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

advance is attributed to increased trucking costs.

Cleveland—Strike-swollen demands on local warehouses continue heavy but pressure on distributors is noticeably easier as compared with ten days ago. Fabricators are pulling in their horns, ordering steel less actively as they run into general inventory difficulties. Some fabricating shops in this area have begun to curtail operations. No actual shutdowns for lack of steel have been reported and are not expected for another couple weeks. Meanwhile, warehouse stocks are being depleted, especially of the popular items. Some delays in replenishing stocks after the strike are anticipated. A little gray market tonnage has appeared here but consumers are shying away from it.

Cincinnati—Steel warehouses are making deliveries as rapidly as possible in face of urgent demand. Most interests are rationing supplies to regular customers and are refusing to deplete stocks on large tonnage orders normally placed with mills.

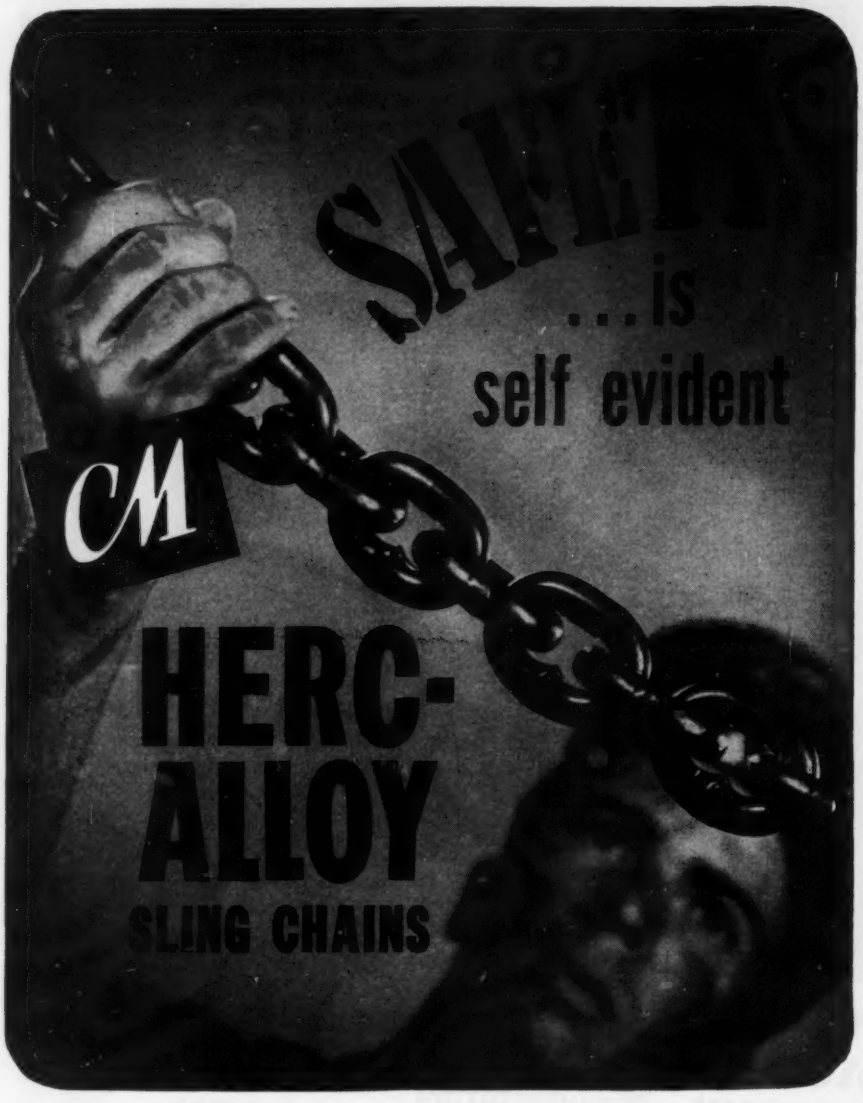
Detroit—Jobbers in this area have been practically cleaned out of stocks, particularly flat-rolled, in the past four weeks, even though inventories were considerably above normal on Oct. 1. A dribble of products is coming in from the few small mills which still are operating. Buyers combing warehouses for fill-in tonnage are being approached again by "gray market" operators, and the local press has carried advertisements offering substantial quantities of sheet and strip at unstated prices. Buick is said to have been offered 2000 tons of 20-gage cold-rolled sheets for 6.5c per pound, f.o.b. Pittsburgh. This is only ¼-cent over the local warehouse price, although freight would bring the delivered cost to 6.9c.

Birmingham—Warehouses in this district had reasonably good inventories of steel at the beginning of the steel strike, but shortages are appearing. They have met fairly satisfactorily consumers' requirements, except for certain structural items and galvanized sheets.

Milwaukee — Outgoing shipments from warehouses this month have been tremendous. How long this rate will be maintained depends on rate of plant closings and size of warehouse stocks. On the latter point, a mixed situation exists. One warehouse says that stocks are still in fairly good balance, except for sheets. Another says that all products are disappearing rapidly. Cold-drawn bars are being used in some instances as substitutes for hot. It has been possible for one interest to supply all items required for some construction jobs, even though those requirements may cover as many as 80 sizes of structural material. Some of the largest concerns have tried to meet production requirements from warehouse stocks. Failing in this, more curtailments are expected momentarily.

St. Louis—Steel warehouses here and in Kansas City, Mo., are amazed at the mild demand for warehouse items. Consumers throughout the southwest are complacent about the strike. Oil companies, some of whom had ample stocks, are doing almost

GOOD NAMES TO KNOW
THE BEST SEVEN SOURCES FOR MECHANICAL SPRINGS
WALLACE BARNES COMPANY
BRISTOL, CONNECTICUT
THE WILLIAM D. GIBSON COMPANY
1800 CLYBOURN AVE. CHICAGO 14,
RAYMOND Manufacturing COMPANY
CORRY, PENNSYLVANIA
BARNES-GIBSON-RAYMOND
6400 MILLER AVE., DETROIT 11, and ANN ARBOR, MICH.
DUNBAR BROTHERS COMPANY
BRISTOL, CONN.
OHIO DIVISION
1712 EAST FIRST ST. DAYTON, OHIO
THE WALLACE BARNES COMPANY LTD.
HAMILTON, ONT. CANADA
U. S. DIVISIONS OF ASSOCIATED SPRING CORPORATION AND CANADIAN AFFILIATE
FOR MECHANICAL SPRINGS



HERC-ALLOY FEATURES

- America's *first* alloy steel sling chain... first to bear a serial number.
- *Every* CM HERC-ALLOY Sling Chain is alloy steel throughout... links, rings, hooks. There is only one grade... *the best.*
- Every chain is individually tested and accompanied by a certificate of registration.
- Links are side welded for maximum strength by patented INSWELL electric method.
- HERC-ALLOY Chains should *never* be annealed.
- HERC-ALLOY Chains are lighter... stronger... easier to handle... outlast ordinary chains 4 to 5 times... cost less on the job.

HERC-ALLOY... the chain you can *SEE* is safe

● A simple visual inspection* is all that is needed to determine the continued serviceability of a HERC-ALLOY Chain. That's why more and more of the important companies are standardizing on HERC-ALLOY... because HERC-ALLOY Chains are immune to unseen dangerous crystallization... because you can *see* when a HERC-ALLOY Chain needs repairs or replacing.

Write for your copy of this new, informative booklet. No charge.

COLUMBUS-McKINNON
CHAIN CORPORATION
(Affiliated with Chisholm-Moore Hoist Corporation)
GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

no warehouse buying. Structural shops also are buying warily. Warehouse stocks, with the exception of galvanized and light cold-rolled sheets, are good although size assortments could be better. Heavy hot-rolled sheets and plates are plentiful. United States Steel Supply Co. is telling its Chicago customers they can be served from the St. Louis warehouse.

Los Angeles—Jobbers are allocating virtually all products, with the exception of structurals and scattered sizes of a few other items not in great demand. Supplies are extremely short in cold-rolled and galvanized sheet, some gages of hot-rolled sheet, light plate, small angles and bars, and widely used diameters of pipe. Warehouse inventories of many of these items cannot last much longer.

Seattle—Wholesalers are allocating available tonnages to regular customers. Demand continues active for out-of-stock items, except heavy plates which are slow.

Scrap . . .

Scrap Prices, Page 92

Pittsburgh—No offers to sell No. 1 heavy melting below $29 are noted, although further weakness in quotations is indicated should the strike continue through mid-November. Current easier price undertone may be reversed following termination of the strike, but this phase possibly will be of short duration because of the indicated reduction in ingot operations once steel inventory pipelines are filled. Generation of scrap is tending downward and this trend will become more pronounced over the next two weeks should the strike continue.

Philadelphia—One district mill has ordered a small tonnage of No. 2 heavy melting steel at $21.50, delivered. Some light miscellaneous buying in other quarters also has been at lower prices, with a result that the current spread is $21.50-$22. Light buying of No. 1 heavy melting steel, which normally would be of little significance, has brought the market on that grade down to $23-$24. No. 1 busheling is off nominally to $21.50-$22; No. 2 bundles, $19.50-$20. No. 1 bundles is easier at $22.50-$23.00, based on small sales.

Machine shop turnings, short shovel turnings and mixed borings and turnings are unchanged; also, bar crop and plate and punchings and plate scrap. Cut structurals are off $1 to $25.00; electric furnace bundles and heavy turnings are off slightly to $24.50 and $23.00-$24.00, delivered, respectively.

Cupola cast is up $1 to $32.50, delivered, and heavy charging box cast and heavy breakable to a spread of $34.00-$35.00, with the outside figure the more representative. Malleable has taken another spurt, now holding at $39.00.

New York—Brokers' buying prices on most grades of scrap are unchanged. Exceptions are reductions on No. 1 cupola cast to $29-$30 and on No. 1 machinery to $31-$32.

Buffalo—Steady to firm tendencies prevail in the scrap market despite

5 correct answers to the problems of metal forming and punching

TRADE **Verson** MARK

PRESS BRAKES

Verson offers three basic groups of press brakes — Junior Series, Intermediate Series and Major Series—to meet every requirement for forming, bending, coping, notching, punching.

JUNIOR SERIES PRESS BRAKES are compact, economical units for lighter jobs and have capacities up to 45 tons.

INTERMEDIATE SERIES PRESS BRAKES are for the in-between jobs that are too heavy for a Junior Brake and not heavy enough to warrant a Major Brake. Capacities up to 60 tons.

MAJOR SERIES PRESS BRAKES are heavy-duty units that offer the utmost in performance, precision and production. They are available in a broad variety of sizes, capacities and styles to meet the most exacting demands. Capacities up to 35-ft. by 1-inch plate.

ALL VERSON PRESS BRAKES, regardless of size incorporate the most advanced features to assure speed, accuracy and power. Send an outline of your requirements and we'll be pleased to make specific recommendations.

Do you have this helpful literature?

VERSON DIE MANUAL, Bulletin DM-48, is an 88 page handbook of press brake dies, punching attachments, press brakes and related information.

MAJOR SERIES PRESS BRAKE CATALOG, Bulletin MPB-48 rev., gives full design details and specifications for Verson Major Series Press Brakes.

JUNIOR AND INTERMEDIATE CATALOG, Bulletin JIB-49, gives full design details and specifications for Verson Junior and Intermediate Series Press Brakes.

Any or all of these bulletins are available on request. Please specify bulletin number of those desired.

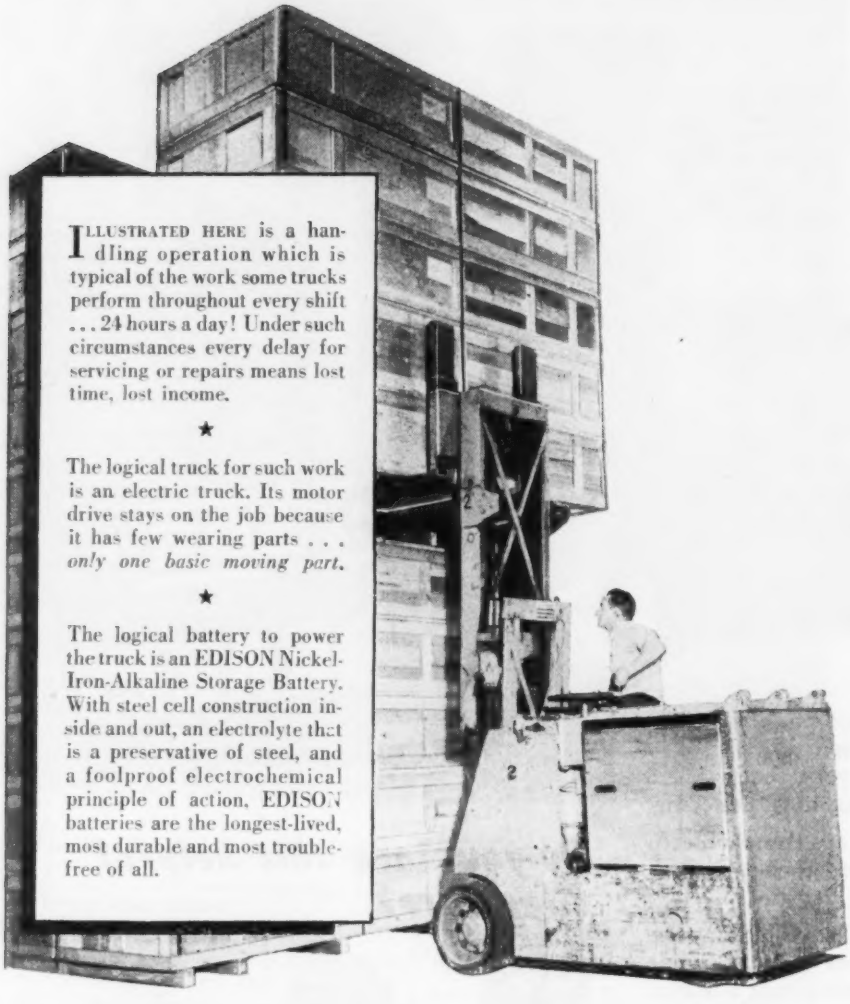
VERSON ALLSTEEL PRESS COMPANY

9318 South Kenwood Avenue. Chicago 19, Illinois — Holmes Street and Ledbetter Drive, Dallas 8, Texas

A Verson Press for Every Job from 60 Tons Up

BLANKING PRESSES • FORGING PRESSES • DRAWING PRESSES • HYDRAULIC PRESSES
PRESS BRAKES • DIES • DIE CUSHIONS

How continuously it works is what counts



ILLUSTRATED HERE is a handling operation which is typical of the work some trucks perform throughout every shift . . . 24 hours a day! Under such circumstances every delay for servicing or repairs means lost time, lost income.

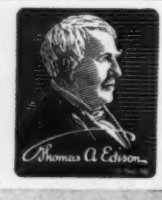
★

The logical truck for such work is an electric truck. Its motor drive stays on the job because it has few wearing parts . . . *only one basic moving part.*

★

The logical battery to power the truck is an EDISON Nickel-Iron-Alkaline Storage Battery. With steel cell construction inside and out, an electrolyte that is a preservative of steel, and a foolproof electrochemical principle of action, EDISON batteries are the longest-lived, most durable and most trouble-free of all.

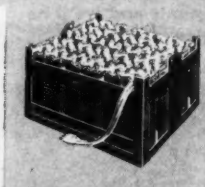
EDISON batteries give you many advantages: they're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle. Get a current EDISON price quotation—you will probably find initial cost MUCH LOWER than you think. Couple this factor with well-known EDISON long life and you will have the key to year-after-year economy.



EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES



EDISON STORAGE BATTERY DIVISION

of Thomas A. Edison, Incorporated, West Orange, N. J.

In Canada: International Equipment Co., Ltd., Montreal and Toronto

the steel industry tieup. Dealers are willing to do business at the prestrike prices subject to shipment after the strike. To cover additional handling costs on material piling up in yards, dealers are paying about $1 less than before the strike.

Detroit—Unexpected firming of prices has been noted, with some purchases concluded by mills apparently in belief the market was at a low point which would permit averaging down scrap costs. All grades are up $1 with the exception of No. 2 bundles and cast iron. The largest local mill has been laying down material in at least three yards and has close to 100 cars on track accumulating "strike demurrage," calculated at a somewhat lower rate than the regular charges.

Cleveland—Scrap interests are beginning to waver in their appraisal of the market. Prices on steelmaking grades are somewhat weaker due to the absence of buying but are expected to remain close to present levels over the next week to 10 days. If the steel strike is not ended by that time, a price decline likely will develop in line with the expected drop in industrial activity.

Chicago — Prices for open-hearth scrap are up again to about the prestrike levels. Even those interests who do not look forward to end of the strike for several weeks are not disposed to part with scrap. New orders for No. 1 heavy melting steel for delivery after the strike were booked last week by brokers. The mills placing these orders apparently agree with traders that prices will soar upon settlement and are buying a little "insurance" now. Consensus of the trade is that No. 1 heavy melting steel and No. 1 bundles list nominally now at $27-$28; No. 2 heavy melting, $26-$27; No. 2 bundles, $24-$25. Electric furnace bundles are quotable at $27-$28 and cut structurals at $28-$29.

Cincinnati—Scrap prices are unchanged. Mills unaffected by labor troubles are taking in tonnage steadily and, despite heavy melt, are accumulating reserves. Dealers' yard stocks are also being augmented in anticipation of an active, higher market.

Birmingham—With heavy melting holding at $25, the scrap market, except for rerolling rails and cast grades, is unusually quiet. Considerable stocking of scrap is reported as continued warm weather and improved prices has stimulated trucking of material. Latest quotation on rerolling rails is $37.

St. Louis—Scrap prices are firmer despite substantially better remote shipments. Rerolling and random length rails moved $1 higher last week as some dealers began a little speculative stocking in anticipation of a wave of demand when the steel strike ends.

Los Angeles—Although some observers had expected that completion of Kaiser's second blast furnace at Fontana would reduce that mill's scrap requirements, its purchases of steelmaking scrap have greatly increased in recent weeks. All other major mills here are affected by the shutdown and are making no scrap commitments.

the tube that helps pay for itself

IT takes 20 operations—from broaching to final milling—to make this tubular spline shaft. Cost of this machining sequence makes the finished shaft a stiff rejection risk . . . only quality seamless tubing can be used for the job. The tubing used in this particular instance, however, helps pay for itself in the bargain.

This dividend stems from a spec change, a new analysis recently adopted by the manufacturer on Frasse recommendation. Costing 10% extra, this tubing, through better machinability, *more* than earns back its slight additional cost.

Elapsed time of the cut-off operation, for instance, has been reduced from 1.03 to .948 minutes. Rough turning once took 3.0 minutes—now requires but 1.72. Broaching is now accomplished in one pass instead of the previous two. And 6.77 minutes of hobbing operation have been cut to 5.72—*with 30% longer tool life*, by the manufacturer's own estimate.

Frasse is a leading distributor of steel tubing—and provides a wide range of immediately available carbon, alloy and stainless analyses to work from. But equally available, and equally useful, are Frasse engineering facilities to help you use tubing to your best advantage. Call *Peter A. FRASSE and Co., Inc., 17 Grand St., New York 13, N. Y. (Walker 5-2200) • 3911 Wissahickon Ave., Philadelphia 29, Pa. (Baldwin 9-9900) • 50 Exchange St., Buffalo 3, N. Y. (Washington 2000) • Jersey City • Syracuse • Hartford • Rochester • Baltimore.*

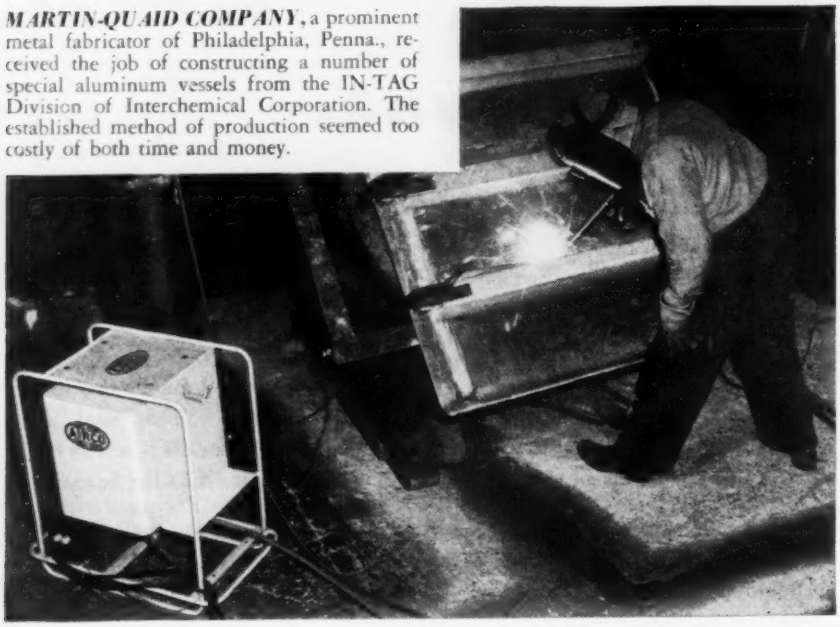
FRASSE

your best bet **for Steel Tubing**

SEAMLESS AND WELDED MECHANICAL TUBING • AIRCRAFT, CONDENSER AND PRESSURE TUBES • STAINLESS TUBING, SEAMLESS AND WELDED • STAINLESS PIPE, VALVES AND FITTINGS

new aircomatic process does three hours' work in fifteen minutes

MARTIN-QUAID COMPANY, a prominent metal fabricator of Philadelphia, Penna., received the job of constructing a number of special aluminum vessels from the IN-TAG Division of Interchemical Corporation. The established method of production seemed too costly of both time and money.



Dana V. Wilcox, Airco Technical Sales Representative, recommended the *new* Aircomatic Process with Airco Helium. Aluminum alloy ½" and ¾" thicknesses was used. The suggestion was adopted, and the process was applied to the job on a production basis.

Prior to the introduction of the new Aircomatic Process, Martin-Quaid used another arc welding method, but found welding time to be a disproportionate amount of its manufacturing costs. For example, the total welding time for a 4' x 5' x ½" side section of the vessel took three hours. With the Aircomatic Process, the three-hour period was reduced to fifteen minutes—a tremendous saving in time and consequently cost.

Due to the speed of the Aircomatic Process as a production tool, Martin-Quaid is planning to expand its aluminum fabrication facilities.

. . . .

TECHNICAL SALES SERVICE — ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

To assure its customers of high efficiency in all applications of the oxy-acetylene flame or electric arc, Air Reduction has available the broad, practical experience of its nationwide Technical Sales Division personnel. The collective experience and knowledge of these specialists has helped thousands to a more effective use of Airco processes and products. Profit by this Airco "Plus-Value" service. Ask to have a Technical Sales Division man call today. Write: Your nearest Airco office. In Texas: Magnolia Airco Gas Products Company. On West Coast: Air Reduction Pacific Company.

AIRCO **AIR REDUCTION**

Offices in Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases... Calcium Carbide... Gas Cutting Machines... Gas Welding Apparatus and Supplies... Arc Welders, Electrodes and Accessories

Rails, Cars . . .

Track Material Prices, Page 87

New York—First important car inquiry in many weeks involves 5000 freight cars for the Union Pacific. The list comprises 2500 fifty-ton box cars, 1400 fifty-ton gondola cars, 750 forty-ton stock cars, 250 fifty-ton flat cars and 100 seventy-ton gondola cars. Buying is at a virtual standstill.

Philadelphia — Pennsylvania Railroad has closed on 60,000 tons of rail for 1950 delivery, with Carnegie-Illinois Steel Corp., Pittsburgh, Bethlehem Steel Co., Bethlehem, Pa., and Inland Steel Co., Chicago. The rail will involve 155, 140 and 133-pound sections.

Chicago—Hopes that railroads will be back in the market for new freight cars soon got a boost this month from a western railroad's inquiry for 5000 units. This inquiry elicited a flood of estimates. There is a possibility that a local interest will increase its building program of cars for its own use, but extent of this has not yet been decided.

Canada . . .

Toronto, Ont.—Buying is at a fairly heavy pace in Canadian steel markets and mills are fully booked on production to the end of the year. Fresh buying move is credited to the fact that the steel strike in the United States may result in a shortage of steel in Canada. Warehouses are well stocked with steel and no shortage is reported in most lines.

Demand for scrap has increased sharply and the supply has tightened. Dealers have marked up prices $4 per ton, which brings them back to ceiling levels. Cast scrap is scarce and dealers are selling at $40-$44, depending on grade.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

750 tons, Dollar Savings Bank, Grand Concourse, Bronx, New York, to Grand Iron Works Inc., that city.

500 tons or more, new plant Bethlehem Pacific Coast Steel Corp., Seattle.

135 tons, braced steel tower, Foster Wheeler Co., New York, to Harris Structural Steel Co., that city.

100 tons, Sheridan Plaza Shopping Center, Tonawanda, N. Y., to the R. S. McMannus Steel Construction Co., Buffalo; Siegfried Construction Co., Buffalo, general contractor

100 tons or more, 38 towers aerial passenger tramway, Mount Hood, Oregon, to Pointer-Willamette Co., Portland, Oreg.

STRUCTURAL STEEL PENDING

3100 tons, veterans hospital, Syracuse, N. Y.; John A. Johnson, Brooklyn, N. Y., low on general contract.

1500 tons, garage, 1515 Seventh Ave. Corp., New York; pending; Kelly & Gruzen, architects.

515 tons, section, state turnpike, Westmoreland county, Pennsylvania; bids Nov. 15.

400 tons, White Plains, N. Y., hospital addition; bids Oct. 21.

325 tons, Alaskan way viaduct, Seattle; plans complete, bids soon.

200 tons, Lucky Peak dam project, Idaho; general bids in.

1 plan helps prevent all 3

When you show the people in your company that you're interested in their welfare, they naturally react favorably. That's why *production goes up* when you boost your employee-participation in the Payroll Savings Plan. Here's how it happens:

The more U. S. Savings Bonds an employee holds, the more secure he feels. The more secure he feels, the greater his peace of mind—the more contented, careful, and productive he is on the job.

Those facts aren't just something we dreamed up. They're borne out in the experience of more than 20,000 companies promoting the Plan.

Everybody Benefits!

Bond sales spread the national debt, thus increasing our national economic security. And, of course, what's good for the nation is good for you and your business!

The individual Bond buyer gets back $4, when his Bonds mature, for every $3 he invested. That's a boon for him, and—multiplied by millions of Bond holders—represents a huge backlog of purchasing power that will help assure national prosperity through the years ahead.

Five Steps Boost Participation

1. See that a top management man sponsors the Plan.

2. Secure the help of the employee organizations in promoting it.

3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Payroll Savings Plan's benefits to them.

4. Make a person-to person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

Nation-wide experience indicates that 50% of your employees can be persuaded to join—without high-pressure selling. All the help you need is available from your State Director, U. S. Treasury Department, Savings Bonds Division. He is listed in your telephone directory. Wouldn't it be a good idea to call him right now, while it's on your mind?

The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

125 tons, two bridges for Alaska Road Commission; general bids in.

REINFORCING BARS . . .

REINFORCING BARS PENDING

1500 tons, Alaskan way viaduct, Seattle; plans complete, bids soon.

100 tons, Washington state highway projects; general bids in.

100 tons, Lucky Peak dam project, Idaho; general bids in.

Unstated, transmitter building for 13th district, U. S. Navy; bids to Seattle, Dec. 9; Spec. No. 21,922.

PLATES . . .

PLATES PENDING

2600 tons, steel piling, Alaska way viaduct, Seattle; plans complete, bids soon.

900 tons, tunnel lining Lucky Peak project, Idaho; Puget Sound Bridge & Dredging Co., Seattle, and Macco Corp., Paramount, Cal., joint low bidders to U. S. Engineer, $1,169,755.

100 tons plus digester covers, Portland, Oreg., sewage system; bids soon.

Unstated, two steel storage tanks, for Northwest Glass Co., Seattle.

PIPE . . .

CAST IRON PIPE PENDING

4800 ft, 16 in. cast iron pipe, city of Allentown, Pa.; bids Nov. 16.

500 tons or more, 23,000 feet 4 to 12 inch cast iron pipe; general bids to Helena, Mont., Nov. 3; contractors to furnish materials. (50 tons in previous unit, placed with Pacific States Cast Iron Pipe Co., Portland, Oreg.)

STEEL PIPE PENDING

1000 tons, steel pipe, involving 8700 ft of 30 in. and 6500 ft of 36 in., city of Allentown, Pa.; bids Nov. 16.

800 tons, 42 in. steel water pipe, Washington, Suburban Sanitary Commission; bids opened last week. Alternates on other types of pipe also were considered.

Unstated, Pacific Water Works Supply Co., low $14,350, to Portland, Oreg.

Unstated, 7500 feet, 4 inch black steel pipe; bids to Bonneville Power Administration, Portland, Oreg., Nov. 3.

RAILS, CARS . . .

RAILROAD CARS PENDING

Great Northern, 66 passenger cars, pending; list includes 30 sleepers, 6 coaches, 6 diners, 6 coffee shop cars, 6 observation cars, 6 baggage cars and 6 baggage-mail cars.

Union Pacific, 5000 freight cars, pending; list comprises 2500 fifty-ton box cars, 1400 fifty-ton gondolas, 750 forty-ton stock cars, 250 fifty-ton flats and 100 seventy-ton gondolas.

CONSTRUCTION AND ENTERPRISE

ILLINOIS

SKOKIE, ILL.—Silver Skillet Brands Inc., 7510 N. St. Louis St., has awarded the general contract for construction of a factory and office building to Federal Constructors, 173 W. Madison St., Chicago, for approximately $180,000; A. Epstein & Sons Inc., 2011 W. Pershing St., Chicago, structural engineers.

KANSAS

JOHNSON, KANS.—City of Johnson, E. S. Hunt, city clerk, has awarded contract for a sewage treatment plant with appurtenances and auxiliaries and construction sewers, manholes, etc., to Burt & Binford Contractors, Hutchinson, Kans., at $103,371. Ediger Engineering Co., 252 Laura St., Wichita, Kans., engineer.

LOUISIANA

SHREVEPORT, LA. — Arkansas - Louisiana Gas Co., Slattery Bldg., has awarded a contract to Latex Construction Co., 2707 Ferndale St., Houston, for construction of 91 miles of 20-inch welded joint natural gas pipeline between the Magnolia area and Perla, Ark., estimated cost $4.1 million; to Anderson Bros. Corp., 707 N. Drennen St., Houston, for construction of 72 miles of 20-inch welded joint natural gas pipeline between Marshall, Tex., and a point in Columbus county, Ark.; and to Omaha Dredge & Dock Co., Omaha, Nebr., for installation of the Red river and Wachita river crossings. The latter two contracts aggregate $3.8 million, making the total construction contracted for about $7.9 million.

MARYLAND

BALTIMORE—Poole Foundry & Machine Co., 1700 Union Ave., Woodberry, Md., has begun erection of a 1-story addition.

BALTIMORE—Consolidated Gas & Electric Light & Power Co. is constructing an addition to its automotive and repair building on Constitution street.

BALTIMORE — Manganese Reduction Corp., recently incorporated to manufacture magnesium chloride, has awarded a contract for a 1-story addition to the building at 3919 E. Baltimore St., which it will occupy.

MISSOURI

ST. LOUIS—Contracts for construction of a $1 million plant for manufacture of automobile antifreeze and petroleum storage facilities have been awarded by J. D. Streett & Co., wholesale petroleum dealers, 4055 Park Ave. Murch-Jarvis Co. Inc., 718 Locust St., has been awarded the general contract; Frank L. Thompson, 104 W. Adams St., Kirkwood, St. Louis, is the architect.

ST. LOUIS—United States Engineer's office, 826 U. S. Court House & Custom House, 1114 Market St., will receive bids about Nov. 20 on construction and installation of equipment for the East Alton pumping station.

NEW YORK

ALBANY, N. Y.—The state of New York will erect a new office building on Elk street to cost $500,000.

OHIO

CANTON, O.—Ohio Steel Products Co. has been chartered through attorneys Ben M. Dreyer, 530 Renkert Bldg., Sherwood Ake and Charles L. Moushey, to manufacture and deal in steel products.

CLEVELAND—Arro Mfg. Co. has been formed by William R. Gallowitz, 9623 Clinton Rd., Louis C. Gallowitz, Pleasant Valley Rd., Berea, O., and Harry Lewis, all principals of the new firm. The company is in the process of developing a new product in the automotive equipment field and expects to become active in about two months. Location of the plant has not been decided upon yet.

COLUMBIANA, O.—F. C. Russel Co. plans an addition to its No. 2 plant at the western edge of town to provide more operating and storage space.

MANSFIELD, O.—Non-Ferrous Perma Mold Inc. has been incorporated by the joint action of the Barnes Mfg. Co. of this city and the Non-Ferrous Die Casting Co. Ltd., London, England. It will specialize in making castings of copper-base alloys by the method of permanent molds.

OREGON

EUGENE, OREG.—Phillipson Retort Mfg. Co. plans industrial charcoal plant; Carl Levy, engineer.

HEPPNER, OREG.—E. S. McKittrick, Los

PROFITS UP-COSTS DOWN
on Quality
STAINLESS STEEL
STEEL
ALLOY STEEL
ALUMINUM
END PRICE WORRIES
PRICES are still the main topic of conversation . . . FEAST OR FAMINE ON SALES . . . A low cost for production must be attained.
YOU can PROFIT . . . by our prompt delivery . . . prime material . . . savings effected on price.
If it's SHEET—STRIP—ROD—WIRE—TUBING—call on us for your requirements and rest assured—we'll do our level best—be it PRICE—DELIVERY—QUALITY.
Large stocks in principal cities
DEPENDABLE Sales CORPORATION
315 Gold St.
Brooklyn 1, New York

THE S F Co.

Lake Superior Iron Ores
Bessemer
Non-Bessemer
Aluminiferous

"Shenango" Pig Iron
Bessemer
Malleable
Basic — Foundry

The SHENANGO FURNACE Company

Oliver Building, Pittsburgh, Penna.

W. P. SNYDER & COMPANY

Iron Ore • Pig Iron • Coal and Coke • Oliver Bldg., Pittsburgh, Penna.

SPRINGS

Since 1905 Hubbard has been making PARTS LIKE THESE

Consult us about them

HUBBARD

M·D·Hubbard Spring Company

401 Central Avenue • Pontiac 12, Mich.

MEDART 2-ROLL ROTARY

STRAIGHTENING
SIZING
POLISHING
MACHINE

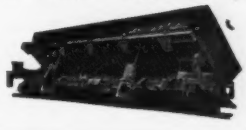
FOR ROUND BARS
TUBES AND WIRE

MANUFACTURING ENGINEERS OF COMPLETE TRANSMISSION EQUIPMENT AND SPECIALIZED MACHINERY

MEDART

THE MEDART COMPANY • 3500 DEKALB ST., ST. LOUIS, MO.

DIFFERENTIAL
STEEL CAR CO., FINDLAY, OHIO



Air Dump Cars, Mine Cars, Locomotives, Lorries
AXLESS Trains and Complete Haulage Systems

New and Practical

HOT-DIP GALVANIZING PRACTICE

By W. H. Spowers Jr.

This new second edition, is written in nontechnical language and discusses the latest, most improved and efficient galvanizing methods. It contains 23 chapters and is profusely illustrated with 56 photographs, 5 tables and in addition 7 large foldering charts.

188 Pages
Price $6.00
Postpaid

Especially noteworthy is the 35-page Bibliography

THE PENTON PUBLISHING CO.

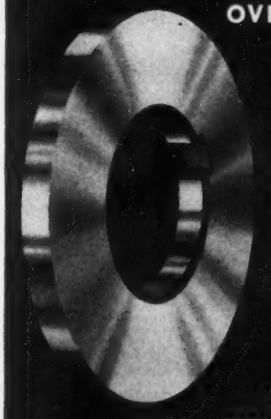
Book Department

1213 West 3rd Street — Cleveland 13, Ohio

COWLES

GANG SLITTING KNIVES

OVER 30 YEARS EXPERIENCE



Standard for *Service* and *Durability*. Ground to extremely close Tolerances and Finish. Made by *Toolmakers*.

COWLES TOOL COMPANY

2086 W. 110th ST. CLEVELAND 2, OHIO

First cost is only a part of the overall cost of your springs

Cost conscious spring buyers know that the first cost does not present the complete picture of spring costs. Uniformity, ease of assembly into your product, on-time delivery are just a few of the other factors that can affect the ultimate cost of your springs. In some cases a minor modification in design can cut costs without any loss of quality. We at Accurate are confident that our springmaking "know-how" and facilities can lower the overall cost of your springs. We have done this for many manufacturers and will be pleased to cite actual cases. Most of all we'd like to show you what we can do for you. Phone or write today for prompt attention.

Accurate Springs

COST CONSCIOUS QUALITY
Since 1930
ACCURATE SPRING MFG. CO.
3823 W. Lake St. • Chicago 24, Ill.
Springs, Wire Forms, Stampings

Angeles, has the contract for construction of $200,000 grain warehouse and elevator, replacing unit destroyed by fire, for Morrow County Grain Growers Inc.

PORTLAND, OREG.—Bids were opened Oct. 17 for proposed Kaiser-Frazer assembly plant at 79th avenue and Columbia boulevard, cost $360,000. Structure will be built for Union Pacific Railway and leased to K-F.

PORTLAND, OREG.—California Bag & Metal Co. will award contract shortly for proposed warehouse, 24th and Nicolai.

PENNSYLVANIA

ERIE, PA.—Pennsylvania Electric Co. will erect a $12.5 million addition to its Front street station. Two years will be needed for completion.

VIRGINIA

RICHMOND, VA.—Esso Standard Oil Co. plans to build a bottled gas plant and oil terminal on James river just below Deep Water terminal; cost $1.1 million.

WASHINGTON

BREMERTON, WASH. — City has awarded contract to Hall-Atwater Co., Seattle, low $197,455, for construction of disposal plant.

SEATTLE—Construction bids for a naval communication system including reinforced concrete transmitter building have been called Dec. 9 by the 13th Naval District. The project will be installed near Arlington, Wash. Specification number is 21,922.

SEATTLE—Bethlehem Pacific Coast Steel Corp. announces immediate construction of a structural steel fabricating plant to be erected on property recently acquired from Isaacson Iron Works. Plans call for a structural shop, completely equipped with forming, punching and shearing facilities for the fabrication of a wide range of steel frame structures. The facilities will include a transmission tower fabricating shop and a complete galvanizing plant. Quantities involved in this building include 500 tons or more of structurals.

SEATTLE—Fire Oct. 20 did damage estimated at $60,000 to the structural steel fabricating plant of Pacific Car & Foundry Co.

WALLA WALLA, WASH.—U. S. Engineer called bids Oct. 26 for 15 transformers, delivery in February, 1950, for McNary dam navigation locks; also Dec. 6 for four hydraulic turbines, including appurtenances, for the same project.

CANADA

LONDON, ONT.—Frid Construction Co. of Hamilton has been awarded the general contract for the superstructure of the new General Motors diesel locomotive plant. Frid company earlier was awarded the foundation contract on the job.

NEWMARKET, ONT.—Office Specialty Mfg. Co. announces plans to erect a steel fabricating plant to be in operation next spring.

FERROALLOYS

(Concluded from Page 89)

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%). Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb of contained V_2O_5, freight allowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8% Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c. f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.55c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); Gross tons per carload, f.o.b. seller's works, Mt. Pleasant or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.10.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.